THE IMPACT OF FINTECH PENETRATION AND GOVERNANCE QUALITY ON FINANCIAL DEVELOPMENT

LIM CAI JIE

LIM CHOO YING

MANDY LEONG PEI YING

NG MEI XUAN

BACHELOR OF FINANCE (HONS)

UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF BUSINESS AND FINANCE
DEPARTMENT OF FINANCE

APRIL 2024

THE IMPACT OF FINTECH PENETRATION AND GOVERNANCE QUALITY ON FINANCIAL DEVELOPMENT

BY

LIM CAI JIE
LIM CHOO YING
MANDY LEONG PEI YING
NG MEI XUAN

A final year project submitted in partial fulfillment of the requirement for the degree of

BACHELOR OF FINANCE (HONS)

UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF BUSINESS AND FINANCE
DEPARTMENT OF FINANCE

APRIL 2024

DECLARATION

We hereby declare that:

(1) This undergraduate FYP is the end result of our own work and that due acknowledgment has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the FYP.

(4) The word count of this research report is <u>19,306</u>.

Name of Student:	Student ID:	Signature:
1. <u>Lim Cai Jie</u>	<u>2101864</u>	
2. <u>Lim Choo Ying</u>	<u>2101846</u>	
3. <u>Mandy Leong Pei Ying</u>	<u>2101638</u>	
4. <u>Ng Mei Xuan</u>	<u>2101833</u>	

Date: <u>18th April 2024</u>

ACKNOWLEDGMENT

First and foremost, we would like to express our gratitude to Universiti Tunku Abdul Rahman (UTAR) for providing us with an opportunity to conduct this final-year project (FYP). Throughout the entire journey, not only have we enriched our knowledge of financial development and fintech, but we have also been equipped with various soft skills such as time management skills, complex problem-solving skills, learning agility, and interpersonal skills.

Secondly, we would like to convey our heartfelt appreciation to our FYP supervisor, Dr. Yiew Thian Hee for his guidance and tremendous support. We can overcome every challenge encountered thanks to his mentorship, constructive advice, and suggestions. Besides, it was an invaluable experience working with Dr. Yiew because he always motivated us to take up challenges and explore new methodologies while conducting the study. Our project would not have been successful without his mentorship.

Thirdly, we would like to express our profound gratitude to our FYP examiner, Dr. Zuriawati binti Zakaria. She has meticulously pointed out several parts where we should make amendments to improve the quality of this report. Moreover, her recommendations have provided better insights that enriched the project.

Last but not least, we would like to show our deepest appreciation to our family and friends who have provided us with unconditional support and motivation. Their encouragement and patience have been the pillars of the success of this project.

DEDICATION

We would like to dedicate the project to everyone who has contributed to the success of this study. Both direct and indirect efforts and contributions of all parties involved are equally invaluable and significant.

First and foremost, we would like to dedicate this project to Universiti Tunku Abdul Rahman (UTAR). We would not have been able to complete the project without the E-databases and facilities provided by the University. Having access to resources such as journal articles and financial information is crucial for us to conduct the study smoothly.

Secondly, we would like to dedicate this project to our FYP supervisor, Dr. Yiew Thian Hee. Throughout the mentorship, he has contributed numerous constructive inputs and invaluable time to assist us in completing the project.

Lastly, we would like to dedicate this project to our FYP examiner, Dr. Zuriawati binti Zakaria. We would not have been able to produce a higher-quality report without her enlightenment and suggestions.

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

.

LIST OF ABBREVIATIONS

2SLS – two-stage least squares

ASEAN – Association of Southeast Asian Nations

ATM – automated teller machine

CS-ARDL – cross-sectionally augmented autoregressive distributed lags model

CV – control variable

DV – dependent variable

EAGLEs – emerging and growth-leading economies

EMDEs – emerging and developing economies

FEM – fixed effects model

FMOLS – fully modified ordinary least squares

FYP – Final Year Project

GDP – gross domestic product

GMM – general methods of moments

GNI – gross national income

ICT – information and communication technology

IMF – International Monetary Fund

IV – independent variable

MM – method of moments

NIM – net interest margin

OLS – ordinary least squares

PSM – propensity score matching

PVAR – panel vector autoregression

QRM – quantile regression model

REM – random effects model

RMB – Renminbi

ROA – return on assets

ROE – return on equity

SDGs – sustainable development goals

UTAR – Universiti Tunku Abdul Rahman

VTBs – village and township banks

WGI – Worldwide Governance Indicators

LIST OF APPENDICES

PREFACE

In the era of digitalization, digital financial technology (fintech) has garnered a lot of attention, especially after the COVID-19 pandemic, as it is perceived to be a tool that promotes financial inclusion in developing nations. This has proven to reduce income inequality and eliminate information asymmetry among underprivileged communities. In essence, it can reach out to more people in the communities including remote and rural areas. Therefore, the accessibility of financial services becomes greater than it used to be as traditional bank branches lack mobility and flexibility. Recently, there have been numerous studies arguing the roles of fintech in affecting financial development but yet to reach a consensus. Hence, it is worth investigating how fintech can impact financial development, especially in lower-income countries as they tend to have weaker and volatile financial systems.

Extending on this, the governance quality of the countries comes into the picture because political stability and government effectiveness play crucial roles in fostering financial development. The economic agents such as investors and borrowers will make decisions based on political stability to ensure the financial systems are efficient and secure. Thus, this study will provide useful implications for the government, especially for nations that are experiencing slow financial development, or financial repression. Since there are no studies that examine the impact of fintech and governance quality on financial development in one econometric model; and no theories that can explain both variables jointly, as per current knowledge, it is worth conducting this study to enrich the literature on the financial development context.

ABSTRACT

The importance of digital financial technology (FinTech) as a fundamental driver of advancing economic development is widely acknowledged. Nevertheless, salient questions on the roles of governance quality and fintech penetration in financial development remain unexplored. Through an investigation encompassing 64 low-income and lower-middle-income countries spanning the period of 2011-2021, the findings reveal that: (1) fintech penetration fosters financial sector development, and (2) a politically stable environment creates a secure financial system that ultimately promotes financial growth. The positive impact is pronounced in countries with higher financial exclusion and higher financial institutions' efficiency. The measures of financial development, fintech penetration, and governance quality employed are private credit, ATM penetration, and political stability, respectively, obtained from the World Bank. Employing the two-step system GMM estimation method, the findings are robust to alternative proxies of fintech, accounting for the country heterogeneity and autocorrelation problems. These results have several policy implications: (1) the policymakers should prioritize reformations to create a stable political environment, and (2) the countries should expand their efforts in promoting fintech to drive financial development.

Keywords: Financial Development, FinTech Penetration, Governance Quality

CHAPTER 1: INTRODUCTION

1.0 Introduction

In Chapter One, a detailed background on financial development and the growth of fintech is provided and the research gap is then identified. Next, research objectives, research questions, and hypotheses are constructed, respectively. Moreover, the significance of the study is discussed comprehensively. Subsequently, the key points for each chapter in this study are summarized in the chapter layout. Finally, important points of Chapter One are summarized in the conclusion.

1.1 Research Background

The World Bank (2024) emphasized that financial development can propel economic growth by promoting savings, mobilizing funds, facilitating foreign capital inflows, and optimizing capital allocation. The stronger the financial system, the greater the financial development. According to Raza et al. (2014), improved financial development promotes welfare and economic growth, while lowering poverty and income inequality, increasing savings mobilization, improving finance access for the underprivileged, and encouraging high-return investments. Beck et al. (2007) revealed that financial development notably raises incomes in the poorest quintile, reducing income inequality. Income disparity reduction constitutes 40% of financial

development's impact on the quintile's income growth, with the remaining 60% contributing to overall economic growth.

In recent decades, the emergence of financial technology (fintech) has garnered a lot of attention since it has profoundly reshaped the financial sector and it is believed to be one of the most crucial drivers of financial development. Rahman et al. (2023) explained that the financial sector is responsible for providing financial access and funds to businesses while also monitoring the economic transactions related to taxation. Song and Appiah-Otoo (2022) defined fintech as digital financial inclusion and the combination of finance and information technology. Fintech pertains to tech-driven enhancements in financial services. Simultaneously, fintech is said to drive financial and social inclusion as it ensures that the banking sector is efficiently allocating resources (Muganyi et al., 2022). Thus, policymakers and businesses have attempted to integrate fintech into the financial environments to promote financial inclusion and accelerate financial development (Berkmen et al., 2019).

Over the decades, technological advancements have evolved the financial sector because of the information and communication technology (ICT) platforms that accelerate the fintech diffusion through automated teller machines (ATMs), mobile payments systems, mobile wallets et cetera (Kanga et al., 2022). The survey by Ernst & Young (2017) revealed that approximately 8 out of 10 of their respondents were aware of the fintech services and almost 33% of them were using more than one of the fintech services (Mention, 2019). However, fintech cannot stand alone. Muganyi et al. (2022) stated that fintech also accelerates the digitalization of conventional banks thanks to its highly efficient and secure features. Thus, tech-savvy users and bank account holders are more confident in using modern and safer financial services from commercial banks that adopt fintech (Goode, 2018). Over the past 25 years, ATM adoption skyrocketed which has significantly transformed financial services globally as shown in Figure 1.1 (Batiz-Lazo, 2018).
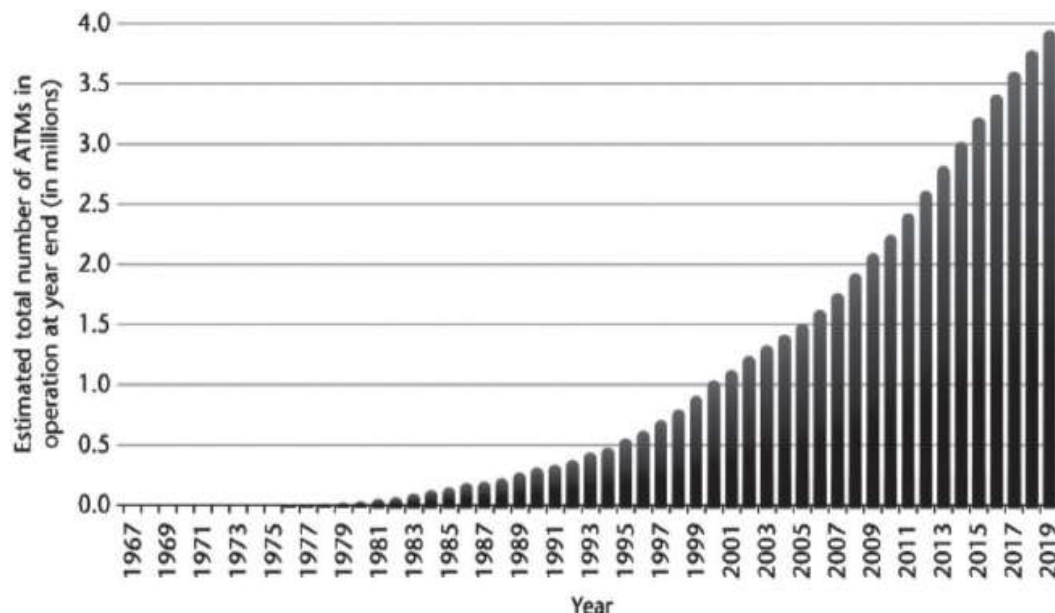
Figure 1.1. The adoption of ATMs from 1967 to 2019 (in millions of units at year-end). Adapted from Batiz-Lazo, B. (2018). *Cash and dash: How ATMs and computers changed banking*. Oxford University Press.

In recent decades, mobile phones have penetrated our lives and become the most important technology and communication tool. Mobile devices have surged in use for services like banking, payments, loans, budgeting, and investing (Katara, 2023). The World Bank (2024) revealed that 80 percent of people own a mobile phone in developing nations which also indicated that today, more people own a mobile phone than those who have access to electricity and clean water. Morgan (2022) found that the speed of fintech diffusion is skyrocketing in ASEAN countries as it reported that 25% of unbanked and 16% of underbanked people utilized digital payment. Makina (2019) explained that this is because fintech provides financial services to sectors that fail to fulfill the minimum loan requirements of commercial banks. Berkmen et al. (2019) stated an example where mobile money applications can be accessed by people living in remote islands and areas, which is a tool to promote financial inclusion. The study of Demirguc-Kunt et al. (2018) also revealed that fintech helps to increase financial inclusion as this group of unbanked and underbanked users can now

participate in the financial markets thanks to the introduction of mobile financial services.

Fast technical innovations like social media and cell phones are widely used in today's globally interconnected economy. Previous studies conducted by Aladangady et al. (2019), Baker (2018), and Galbraith and Tkacz (2007) have also shown that fintech is increasingly playing a key role in determining how the financial sector develops. Demir et al. (2022) also underscored that mobile financial services have the greatest potential among others to provide formal financial services access for the under-banked population. Therefore, the impact of mobile penetration on financial growth is said to be more tremendous in low-income and lower-income nations (Ahmad et al., 2023).

Today, financial digitalization and fintech adoption are undoubtedly essential in financial sector development as it is believed to drive the banking sector significantly (Syed et al., 2021). The financial services can be easily accessed through mobile applications and ATMs and the services include online payments, savings, investments, and remittances (Kshetri & Loukoianova, 2019; Rahman et al., 2023). One of the reasons that skyrocketed fintech penetration in financial markets is due to the COVID-19 pandemic (Aduba et al., 2022). Based on the view of Tay et al. (2022), the COVID-19 pandemic has hastened the digital transformation of financial institutions by encouraging the usage of cashless, contactless payment methods. For instance, about 80 million people in India made their first digital merchant payment. Furthermore, more than 100 million adults, including 82% of those in China, made digital merchant payments for the first time since the pandemic began in 2021. According to these figures, the introduction of digital payments was expedited by the pandemic and social isolation barriers (Demirguc-Kunt et al., 2022). However, concerns like low awareness of the cashless policy still exist in other developing nations.

Adults with an account (%), 2014–21
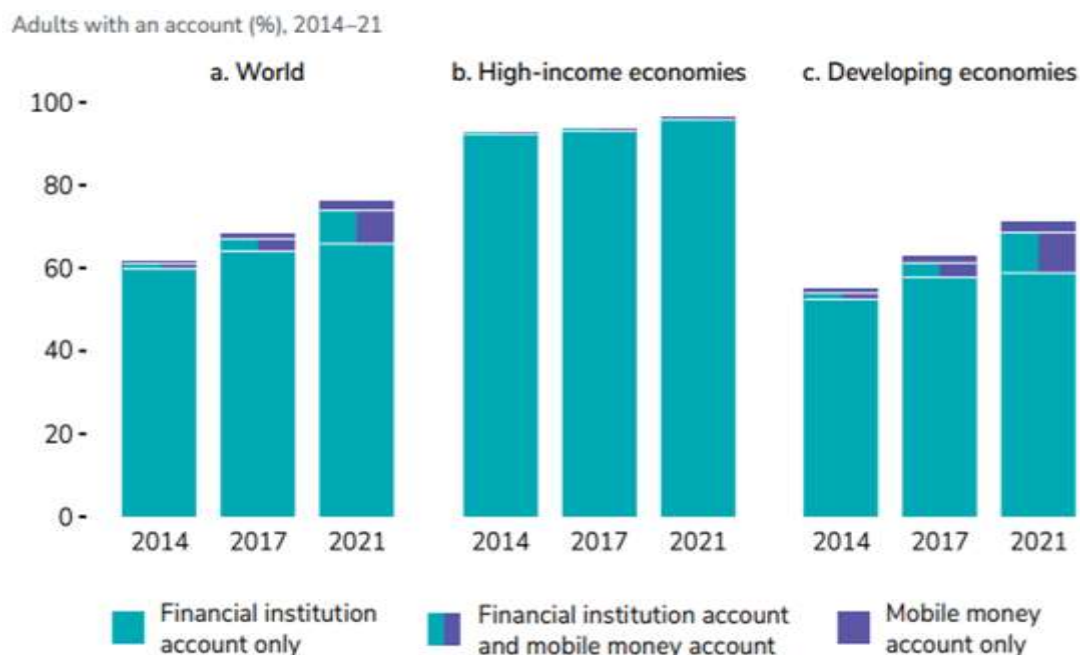
Figure 1.2. Adults with an account worldwide (%), 2014-2021. Adapted from Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19*. World Bank Publications.

According to Figure 1.2 derived from Global Findex Database 2021, people with mobile money accounts increased by eight percent point from 2014 to 2021 in the world, including developed countries and developing countries. The era of digital pervasiveness started in 2014, hence Global Findex began collecting and organizing data from 2014 rather than from 2011. Mobile money account holders in developing economies have gradually accelerated in the past decade. Besides, Figure 1.2 also demonstrates that the users prefer to have both a financial institution account and a mobile money account. In other words, financial systems in developing nations require both traditional banks and fintech to foster financial development. Unlike the high-income economies where adults depend largely on financial institutions since they have stable and well-governed financial systems.

Adults with an account (%), 2014–21
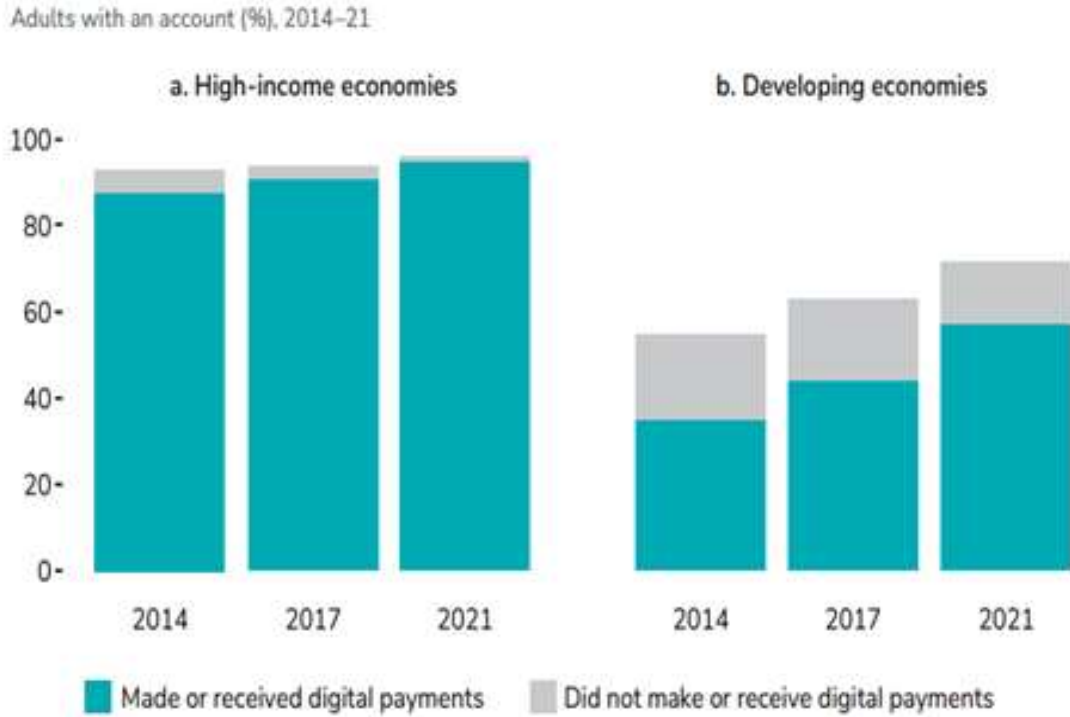
Figure 1.3. Adults who made or received digital payments, 2014-2021. Adapted from Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19*. World Bank Publications.

According to Figure 1.3 derived from the Global Findex Database 2021, in both high-income and developing nations, the number of people using digital payments increased significantly between 2014 and 2021. Similarly, data was first gathered in 2014 because digital payments had become almost universal by that point. Manifestly, the growth in digital payments was parallel to the growth of account ownership as shown in Figure 1.2. In essence, Figure 1.3 demonstrates that despite there being a spike in mobile money account ownership, the utilization of digital payments remained low since there were still large groups of financially excluded adults in developing nations.

Adults with an account (%), 2011–21
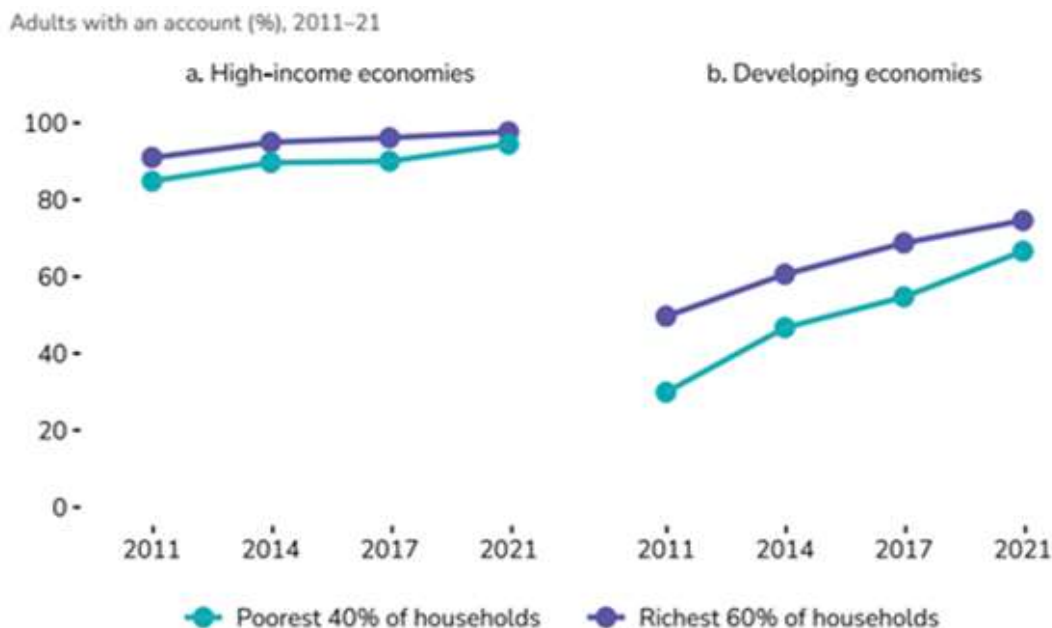
Figure 1.4. Income gap in high-income economies and developing economies, 2011-2021. Adapted from Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19*. World Bank Publications.

Referring to Figure 1.4 derived from the Global Findex Database 2021, there was a significant reduction in the income gap of both developing and developed economies, especially from 2017 to 2021. Hence, the statistics have proven that the diffusion of digital payments helped to promote income equality globally.

Despite great efforts that have been made to promote financial inclusion, there are 1.7 billion adults remain excluded from utilizing formal financial facilities, and more than 700,000 of the population who have access still do not utilize the facilities (Demirgüç-Kunt et al., 2022). This is due to the distance, high cost, and complex documentation processes to access financial institutions (Demir et al., 2020; Demirgüç-Kunt et al., 2018). Another arguable issue is that fintech could be detrimental to the traditional banking system due to the limitations of the platform and credit risks resulting from

borrowers' default. This situation happened in China where more than 5,000 peer-to-peer lending platforms collapsed between 2014 to 2019 due to outstanding loans amounting to nearly RMB 120 billion (Ding et al., 2021; Tian & Hassan, 2019; Wei, 2015).

According to economic theory, a stable and effective financial system is of paramount importance in maintaining sustainable growth. Čihák et al. (2013) identified four essential attributes of a financial system: depth, access, efficiency, and stability. Comparatively, financial systems in developing economies tend to be less extensive, less efficient, and less accessible compared to their counterparts in developed economies. However, global financial landscapes exhibit significant disparities due to diverse national performances. Dosso (2023) further underscored the critical importance of high-quality financial institutions and effective governance in driving financial development. In a similar vein, Bekana (2023) highlighted how improving the quality of financial institutions positively influences economic development by establishing rules and regulations. Governance assumes a multifaceted role encompassing supervision, regulation, infrastructure development, and the promotion of macroeconomic stability (Arora, 2017). In China, the findings of Anagnostopoulos (2018) and Muganyi et al. (2022) revealed that the fintech innovations coupled with regulatory fintech (regtech) can help to enhance the efficiency, stability, and security of the financial systems. This implies that regulatory quality is paramount to maintaining the financial systems' stability, which helps to promote financial development. Similarly, the study of Muganyi et al. (2022) highlighted fintech's potential to amplify financial development through regulatory advancements. Tay et al. (2022) also revealed that fintech will drive the progress of achieving Sustainable Development Goals (SDGs) when the environment is well-regulated.

Expanding on this, Stiglitz (1998) underscored that government intervention is likely to enhance market performance. This intervention encompasses controlling key variables such as inflation rates, deposit and borrowing rates, exchange rates, and

establishing legal and accounting frameworks. A tangible instance lies in the Asian Crisis, where Thailand's weak government regulation resulted in negative financial growth. Moreover, government support is necessary for fintech development because of the introduction of regulation and control over business and financial institution activities in the financial sector (Baltgailis & Simakhova, 2022). In essence, various factors shape financial development, including institution performance, financial inclusion, government policies, and the emerging role of fintech. Fintech's relatively new presence in the financial market, especially in developing countries, makes it a significant focus which worth delving into. Hence, the objective of this research is to investigate the impact of fintech penetration and governance quality on financial development.

1.2 Problem Statement

The factors of financial development and the role of fintech in fostering financial inclusion have been extensively studied in the past literature (Aduba et al., 2023), particularly considering the COVID-19 pandemic's acceleration of the 21st century. However, salient questions remain unanswered. Bekana (2023) highlighted that the level of national savings relies on financial development and that economic growth has been proven to be driven by financial development in many past studies (Song et al., 2021; Uzar et al., 2023; Yang, 2011). Thus, it is essential to identify the exact drivers of financial development so that policymakers can make the right decisions to promote economic stability and prescribe the right macroeconomic policies (Bekana, 2023).

The latest empirical study conducted by Aduba et al. (2023) focused its investigation on about 80 emerging and developing economies (EMDEs), whereby the findings

demonstrated that fintech has boosted financial development in countries with poor financial inclusion and underperforming financial sectors. These findings are similar to existing literature (Ahmad, 2023; Berkmen et al., 2019; Kanga et al., 2022; Zaghlol et al., 2021). Another study conducted by Song and Appiah-Otoo (2022) found that cases of borrower defaults in fintech platforms could disrupt the deposit growth (an indicator of financial development) and liquidity of traditional banking in China, ultimately hindering its economic growth. Hence, the results obtained from different sources are debatable, which means that determining how fintech affects financial development in different countries is of utmost importance.

Most of the researchers emphasized their studies in China (Bu et al., 2022; Guo & Zhang, 2023; Muganyi et al., 2022; Song & Appiah-Otto, 2022), as fintech adoption has been well-implemented in China for the past few decades. The fintech market in China can be said to be highly dominated by several very large players. For instance, the prominent Ant Group provided wealth management services to more than 600 million people in 2019 (Muganyi et al., 2022). Today, Sun et al. (2021) reported that most of the conventional financial institutions in China have collaborated with fintech companies to formulate innovative consumer-centric strategies to provide financial services that fulfill the needs of Generation Zs. To systematically eliminate political risks, the fintech players also worked closely with the regulators. In short, past literature in China itself does not reach a consensus and these findings also focus largely on the economic growth of China, instead of financial development.

On the other hand, fintech penetration has largely increased in other regions such as ASEAN, where 25% of unbanked and 16% of underbanked customers are using digital payments (Morgan, 2022), particularly after the COVID-19 pandemic (Aduba et al., 2023). Thus, this issue should not be neglected, and the previous results are not representative worldwide. In terms of financial inclusion, Kim et al. (2018) stated that almost two billion adults have no access to formal financial services internationally, which leads to high financial exclusiveness and hence, negatively affects the financial

development of a country. This issue particularly happens in African countries such as Ghana as consumers have weak trust in banks due to the high number of bad loans and panic withdrawals (Koomson et al., 2023). No doubt, the global financial inclusion issue remains prevalent, and further investigation is worthwhile.

Jamil et al. (2023) found that a policy framework developed by legislators and digital fintech professionals can promote collaboration and financial inclusion to maintain economic stability. This can be related to the findings in China (Muganyi et al., 2022; Sun et al., 2021). Hence, this will link to another important factor – governance quality, to further promote financial inclusion and financial development. Berkmen et al. (2019) also revealed that the regulators and financial institutions in Latin America and the Caribbean attempt to integrate technologies into financial services to promote financial inclusion and financial development. Nevertheless, the approach poses threats to financial integrity because it increases the cyber risk which causes digital transactions to become prone to criminal activities (Kopp et al., 2017). Moreover, consumers' data could be misused by unethical fintech firms (da Silva, 2018). Hence, the limitations of fintech adoption are due to insufficient regulatory supervision and appropriate policies to govern the usage of fintech services (Berkmen et al., 2019).

Furthermore, some existing literature highlighted factors that are hindering the financial development of a country, such as poor governance and institutional quality (Bekana, 2023). To drive the financial sector activities, it is of paramount importance to enhance macroeconomic stability, which can be achieved by prudential regulations and supervision. Nevertheless, there are debates among the past studies regarding the nexus between financial development and governance quality, and which proxies can represent the governance quality most appropriately. For instance, Appiah-Otoo et al. (2022), Asongu and Nwachukwu (2017), Batuo et al. (2018), and Bekana (2023) blamed the lack of regulation framework and political instability for causing the slow growth of financial sector development in African countries. Demir et al. (2022) revealed that corruption can be addressed by adopting fintech as it helps to streamline

and automate government services and tax collection. Similarly, Anagnostopoulos (2018) highlighted that though it is important to promote fintech adoption to ensure the stability of banking systems, regulations are equally crucial to create a more stable and safer financial services environment. Even in countries with high fintech adoption, the World Bank (2018) still reported that despite the rapid financial development, the growth remains incomplete and unsustainable due to a lack of formal regulations in the financial markets (Muganyi et al., 2022). Apart from fintech adoption, Ma et al. (2024) found that the political rent-seeking environment, caused by weak political rights, tends to have high financial exclusion because the consumers are not confident in utilizing the financial accounts in unstable financial institutions. Thus, it distorts the capital allocation of the financial institutions causing high financial exclusion. Hence, poor governance quality is said to be detrimental to financial development as it brings a negative impact on both independent variables (fintech and financial inclusion).

On the other hand, some authors suggested that countries with excessive political restrictions could be detrimental to financial development. Krifa-Schneider et al. (2022) and Song et al. (2021) found that corruption is the driver of development in countries such as South Korea and China because bribery can speed up money transactions and shorten the bureaucratic process. Hence, there are still unsolved questions on how governance quality will impact the financial development of a country, and in fact, existing studies either emphasized African countries or simply generalized the impacts of different countries. In this research, we will adopt the indicators of WGI as the proxies to investigate the impact of governance quality on the financial development of countries with different income levels.

The existing studies on all these independent variables mostly concluded their nexus with the economic development in different countries (Bu et al., 2022; Kim et al., 2018; Struthmann et al., 2022; Uzar et al., 2023). For instance, Bu et al. (2022) revealed that fintech development is positively associated with economic growth, especially when it breaks through the inflection point. However, literature that focuses solely on financial

development is limited, which requires further investigation and exploration. Additionally, as the results can influence policy and the implementation of laws, it is beneficial to look at how the adoption of fintech and the quality of governance affect financial development in less developed nations. Hence, the impact of fintech penetration and governance quality on financial development across 64 low- and lower-middle-income countries will be examined in this study using the GMM estimators, along with the control variables – financial inclusion and financial performance. Additionally, country-specific variables like GDP per capita and population size will also be taken into consideration.

1.3 Research Objectives

1.3.1 General Objectives

The general objectives of this study are to investigate the impact of fintech penetration and governance quality on financial development in 64 low-income and lower-middle-income countries. Meanwhile, the country-specific factors affecting the speed of fintech penetration, and the extent of governance quality are further assessed in this study.

1.3.2 Specific Objectives

The following specific objectives are constructed to achieve the proposed general objectives.

1) To examine whether there is a significant relationship between fintech penetration and financial development in 64 low-income and lower-middle-income countries.

2) To examine whether there is a significant relationship between governance quality and financial development in 64 low-income and lower-middle-income countries.

1.4 Research Questions

To provide a concise direction in this study, the following research questions are developed.

1) Is there a significant relationship between fintech penetration and financial development in 64 low-income and lower-middle-income countries?

2) Is there a significant relationship between governance quality and financial development in 64 low-income and lower-middle-income countries?

1.5 Hypotheses of the Study

H1: There is a significant relationship between fintech penetration and financial development in 64 low-income and lower-middle-income countries.

H2: There is a significant relationship between governance quality and financial development in 64 low-income and lower-middle-income countries.

1.6 Significance of Study

Firstly, this study would enrich the existing literature and enhance the corpus of knowledge on the financial development of low-income and lower-middle-income countries. In this study, governance quality is incorporated into the econometrics model to examine its impact on financial development, which previous studies have neglected. Jamil et al. (2023) revealed that digital financial services must be included in policy frameworks to advance financial growth. The growth of states' financial sectors may be significantly and favorably impacted by improvements in general governance quality (Bekana, 2023). Therefore, this research adds to the gaps in past academic research. Although numerous investigations have revealed the relationship between fintech, financial inclusion, and financial development, the authors mainly focus their investigation on emerging and developing economies (EMDEs), especially China where fintech adoption is already mature in the financial systems (Muganyi et al., 2022). Hence, this study aims to examine the relationship between these three variables in countries with high financial exclusion due to inefficiency in resource allocation. Therefore, the policymakers including government and financial institutions can refer

to the outcome of this investigation for enactment and establishment of policies to promote financial development. This initiative is aligned with Sustainable Development Goals (SDGs) – Goal 8 to achieve inclusiveness in all states by 2030. Undoubtedly, achievement of the goal requires worldwide efforts thus, the findings of this study will be helpful to countries that are still at the initial stage of fintech adoption.

Secondly, future researchers in the field can utilize the findings obtained from this study to investigate potential drivers of financial development. This investigation spans the years 2011 to 2021. A comparison will then be made with the findings of earlier studies conducted in other nations to deliver more recent findings. As governance quality is included as a new variable in the empirical model, North's (1981) institutional theory and Porta et al.'s (1998) law and finance theory are discussed comprehensively in the theoretical framework. It is worth investigating how these two frameworks interact with the theory of "technological spillover" and financial market imperfections theory to explore how fintech penetration and governance quality contribute to financial growth. The latter theory is relatively new as the emergence of technology only happened over the decades. Consequently, a review of these theories may bring more innovative ideas to future scholars.

Lastly, the fintech companies and digital transaction services providers will benefit from the outcome of this research. They can utilize the results to formulate strategies in promoting their fintech services at affordable prices in countries with low digital financial inclusiveness. Moreover, it is of utmost importance to understand the policies and regulations of a nation to ensure compliance before entering the market. Therefore, the study on governance quality can provide the fintech service providers with an overview of the political stability and rule of law of a particular nation. This is vital for their decision-making as businesses tend to look for regulatory-friendly and politically stable environments. It would create a win-win situation if the service providers could collaborate with the governments in promoting financial inclusion through fintech adoption, ultimately boosting the nation's financial development.

1.7 Chapter Layout

Chapter One provides a comprehensive view of the research background and problem statement. Moreover, the chapter also covers the research objectives, research questions, hypotheses, and the significance of the study.

Chapter Two outlines the empirical models and theories of past studies on financial development. The dependent and explanatory variables are reviewed comprehensively with the support of rich literature. The theoretical frameworks employed are discussed followed by the development of the conceptual framework and hypotheses.

Chapter Three discusses the research methodology. The data collection method, country sample selection, research framework, and econometrics model will be explained in detail in this section. Then, the dynamic panel generalized methods of moments (GMM) will be explained comprehensively.

Chapter Four presents the findings generated from StataMP, and this is of paramount importance to achieve the research objectives proposed in the earlier section. Detailed interpretations are discussed along with the support of past studies. Additionally, diagnostic checking and robustness checks are performed to prove the reliability and consistency of the empirical model.

Chapter Five highlights the research findings obtained from the data analysis. Further discussions and implications are made according to the findings. This section identifies the shortcomings of this research, and several constructive suggestions are provided for future researchers.

1.8 Conclusion

To sum up, there are various factors affecting financial development as reported by numerous scholars. However, some of the factors such as governance quality have yet to be explored and discussed in past studies, as per our knowledge. Moreover, their findings cannot reach a consensus due to country-level variations. Hence, this research attempts to examine the impact of fintech penetration and governance quality on financial development in 64 low-income and lower-middle-income countries. The independent variables employed are fintech penetration and governance quality, along with the control variables: financial inclusion, financial performance, GDP per capita, and population size.

CHAPTER 2: REVIEW OF LITERATURE

2.0 Introduction

In Chapter Two, the review of literature on the dependent variable (financial development) will first be discussed. Next, the relationship between the dependent variables and two independent variables namely: FinTech penetration and governance quality are summarized, according to the rich literature that we obtained from reliable sources. Thirdly, a review of the literature on control variables: (1) financial inclusion, and (2) financial performance is provided. Fourthly, the theoretical frameworks will be explained in detail, followed by a conceptual framework developed specifically for the study. Lastly, the hypotheses are constructed based on past studies and theories.

2.1 Review of Literature

2.1.1 Dependent Variable – Financial Development

The study of Goldsmith (1959) initially conceptualized financial development as a transformation in financial structure that was most noticeable in two areas: (1) the growth of financial aggregates, and (2) the enhancement of financial structure. Based on economic theory, financial development is facilitated by a well-organized financial

system (Abbasi et al., 2021). Beck and Levine (2005) defined financial development as the presence of stable and deep credit markets in an economy. While more recent researchers claimed that financial development is supposed to be multidimensional, four areas including access, depth, efficiency, and stability must be considered to get more accurate findings (Muganyi et al., 2022; Sahay et al., 2015). Many empirical studies support that financial development not only drives economic advancement but also increases living standards. This is because an increase in financial development raises the efficiency and resources available in the financial markets, capital accumulation, accelerated technological innovation as well as the overall importance of the investments and financial system (Aman et al., 2022; Azeem et al., 2015; Kapidani & Luci, 2019; Rajapakse & Mayakaduwa, 2019).

However, many developing countries are still suffering from a low level of financial development. Based on the financial development database published by IMF, approximately 83% of countries in Sub-Saharan Africa are ranked among the lowest of 60 countries in the world. This is because they have underdeveloped financial sector and financial markets (Chigeto et al., 2024). The structural conditions can either restrict demand or hinder certain countries' capacity to meet the increasing demand (Becerra et al., 2012). For example, demand deficiencies are determined according to the nation's development level. Compared with countries in advanced phases of economic, countries in the early phases of economic or industrialization development generally do not require deep and highly sophisticated financial markets for their economies. Hence, it poses obstacles to their financial development (Becerra et al., 2012). As a result, cross-country gaps in financial development are increasingly widening. On the other hand, if the differences in financial development between countries persist, or even expand, it may exacerbate the problem of world income disparity (Sever & Yücel, 2023).

In recent years, the rate of globalization has increased rapidly. Simultaneously, customers are more aware of complex financial transactions which consistently amplify

the demand for sophisticated financial sectors. To satisfy these needs, the financial sector adjustments have become a part of their structural adjustment strategy (Otchere et al., 2017). Gong et al. (2023) stated that a sound financial system is crucial for economies to function and is also crucial to overall stability and economic progress. Financial system development can lower borrowing costs by giving investors access to sufficient credit. When the private sector extends at a high level of credit, it can facilitate investment and mobilize capital thereby enhancing productivity and boosting economic growth (Ikhsan & Satrianto, 2023). According to the study of Odhiambo and Musakwa (2024), the reforms of financial sector development result in an increase in market liquidity and financial innovation, thereby individuals and businesses have greater accessibility to capital, which promotes investing and saving through entrepreneurship as well as effective allocation of resources. According to Nehru (2015), most of the undeveloped economies have started to carry out financial restructuring to obtain the backing of an efficient financial structure. With the effort of building a well-developed financial sector, it can establish a sustainable and balanced economic development.

In short, numerous existing studies have recognized the impact of financial development on economic growth. This has also prompted many researchers to examine the factors that affect financial development. However, empirical research on those factors is incomplete, hence, further research is needed. Therefore, this study will delve deeper into various aspects of financial development and examine the impact of each major determinant of financial development in narrowing the cross-national gaps. This is of utmost importance for the policymakers in emerging and developing countries that are planning to reform the under-developed or undeveloped financial structure.

2.1.2 Independent Variable (1) – FinTech Penetration

Fintech is a combination of "financial" and "technology" – the authors defined it as leveraging current information and information technology by applying new technological innovations in providing financial services (Muganyi et al., 2022; Nicoletti, 2017). Numerous scholars concurrently agreed that fintech is positively related to financial development and its impact on the latter can be intensified by promoting financial inclusion with appropriate policies. These findings were obtained in various emerging economies which can benefit more from fintech innovations since developed nations tend to have mature financial sectors with forefront fintech innovations (Aduba et al., 2023; Ahmad et al., 2023; Berkmen et al., 2019; Cole et al., 2019; Jagtiani & Lemieux, 2018; Kanga et al., 2022; Leong et al., 2017; Ozili, 2018; Sahay et al., 2020). On top of that, Aduba et al. (2023) also reported that fintech adoption in nations with weaker financial sector performance could promote financial development. In essence, fintech is proven to enhance operational efficiency in political and financial institutions as it streamlines tax collection processes and extends financial services such as loans to clients without needing bank branches and staff to act as middlemen to facilitate transactions between lenders and borrowers (Abbasi et al., 2021; Basten & Ongena, 2020; Demir et al., 2022; Zaghlol et al., 2021).

As unbanked users who have mobile money accounts can now directly receive money, it increases the incentive for savings and subsequently contributes to an increase in national savings (Atta-Ankomah, 2022; Breza et al., 2020). In developing countries, Sapovadia (2018) reported that the usage of mobile and online payments brings a positive impact on financial literacy and hence, helps to boost financial development. Furthermore, the findings of Aduba et al. (2022) supported the fact that the impact of fintech is especially significant in countries with lower loan efficiency because it is said to substitute the traditional loaning systems by introducing innovative services such as peer-to-peer lending and mobile lending.

On the other hand, Cole et al. (2019) and Dharmadasa (2021) held an opposing view as they argued that fintech adoption might disrupt the systems of financial institutions as it is a substitution for traditional banks. Consequently, fintech could bring adverse effects to the conventional financial system and hinder the financial sector's performance. The authors explained that on top of speeding up financing processes, fintech services provide incentives for the investors as they will enjoy low-cost risk management and risk transformation as the role of intermediaries becomes obsolete (Dharmadasa, 2021). In the studies of Guo and Shen (2016), and Hou et al. (2016) conducted from 2003 to 2014, the early stage of fintech adoption was effective in reducing risk and management. However, they discovered that the risk and costs bounced up during the growth phase, therefore, adversely affecting the bank's performance in the long run. Besides, several studies concluded that fintech has increased competition among banks (Albaity et al., 2019; Boyd & De Nicolo, 2005). As the level of competition in the market increases, the surplus decreases, leading to a decline in the quality of the bank's products and services (Nguyen & Dang, 2022). Hence, it can be said that the growth of the financial sector is impacted by fintech development, which hurts financial stability.

To address the issues of autocorrelation, heteroscedasticity, and cross-sectional dependency, Aduba et al. (2023) used the feasible generalized least squares approach to achieve the estimation findings from a panel of eighty countries. Furthermore, Muganyi et al. (2022) investigated related findings where fintech has a favorable influence on financial development using two-stage least squares instrumental variable regression approaches. In addition, this study also employed the difference-in-differences approach to examine the policy measures of China. In the research of Aduba et al. (2022), scholars employed ordinary least squares regression (OLS), fixed effect model (FEM), and random effects model (REM) with panel data comprising 60 countries from 2010 to 2010 to examine how fintech substantially influences financial development. Some scholars have adopted a methodology that takes into account the short-term and long-term effects. For instance, Kanga et al. (2022) used panel data

regression and the error correction model to separate the short- and long-term impacts of fintech penetration for a panel of 137 nations between 1991 and 2015. To capture the simultaneities between the three variables, the authors performed a 3-stage least squares estimation, which other scholars do not commonly do. Similarly, Rahman et al. (2023) chose the latest econometric approaches: (1) bootstrap panel causality and (2) the cross-sectionally augmented autoregressive distributed lags model (CS-ARDL) to isolate the long-run and short-run relationships of fintech and financial development.

In general, the findings from the past literature supported the fact that fintech can improve the efficiency of the banking sector as it operates in a less restrictive environment as compared to the conventional sector (Dharmadasa, 2021). Moreover, the studies also agreed that fintech diffusion is beneficial to nations with high financial exclusion populations, as these countries can leverage fintech to increase inclusiveness and ultimately drive financial development. Nevertheless, arguments arose as some of the financial development indicators are closely related to financial institutions and banks. As a substitution for traditional banks, fintech penetration could cause the disintegration of the banking sector in the future and ultimately cause financial repression. Since fintech is still in its infancy and has many unanswered questions, it is thus exceedingly difficult for scholars to come to a consensus about the association between its penetration and financial development. Purnomo and Khalda (2019) found that although fintech penetration can be detrimental to the banking sector, this effect only lasts in the short run. In the long run, digitization is supposed to have cost-saving effects, as it has been proven that banks can save up to 30% after adopting fintech. Apart from that, the macroeconomic variables and policy measures employed by different authors vary because the country-level economic growth is different; therefore, it could be the reason that causes disputes in the findings.

2.1.3 Independent Variable (2) – Governance Quality

Various researchers held the view that political stability has a positive impact on the growth of financial markets and banking systems because the government plays a vital role in encouraging depositors, investors, and shareholders to participate actively in the financial markets and institutions (Becerra et al., 2012; Chletsos & Sintos, 2024; Gazdar & Cherif, 2014; Khan et al., 2022; Levine, 1999). For instance, the study by Khan et al. (2019) conducted for 15 emerging and growth-leading economies (EAGLEs) found that nations with unstable institutions are experiencing financial repression as there is a lack of proper macroeconomic policies to drive the growth of financial markets. This is consistent with the research of Huang (2010) over 38 years in 123 nations, discovered a complimentary link between financial development and political stability.

In events of violent political conflict such as terrorism, civil war, and coup d'état, stock markets are affected, which then hinders financial development (Asteriou & Siriopoulos, 2000; Roe & Siegel, 2011). This is supported by the literature of Batuo et al. (2018) and Bekana (2023) on African economies. The authors found that financial backwardness is mainly due to weak rules of law and poor regulatory quality. Under a stable regime, democratic nations tend to have better protection of property rights, control of corruption, and contract enforcement, which helps to propel financial development (Girma & Shortland, 2008; Grittersová, 2022). Ma et al. (2024) underscored that the tendency toward corruption is lower in a competitive political environment due to constant public monitoring. As politicians are impeded from bribery and misuse of wealth, the availability of discretionary money increases, thus promoting financial inclusion among the citizens.

However, some past studies beg to differ as regulation could be a barrier to promoting financial development because the integration of fintech and testing of innovations

require a favorable regulatory environment (Mention, 2019; Zetzsche et al., 2017). The empirical results of Yang (2011) concluded that democracy becomes statistically insignificant to financial development after taking into account country-specific factors. Similarly, Khan et al. (2022) revealed that the rule of law is negatively correlated to financial development in most of the 189-panel countries and hence, concluded that most developing and emerging economies have weak rule of law. Moreover, Marchionne et al. (2022) suggested that despite the financial deregulation might cause short-term instability in emerging economies, it is a good approach to stabilize the market in the long run.

Surprisingly, corruption is believed to increase the efficiency of the bureaucratic process and liquidity hence, foster financial development in developed nations such as China and South Korea (Ahlin & Pang, 2008; Song et al., 2021). This could be related to the results of Khalid and Shafiullah (2021) whereby governance quality is not a pre-requisite for financial development because institutional reforms are supposed to be fostered by financial development. This study revealed an opposite relationship between the two variables. The scholars agreed that a successful reformation requires adequate access to financial resources and corruption is believed to promote liquidity in the financial markets (Song et al., 2021). In short, the findings of these authors oppose the idea of excessive governance control on the financial systems because imposing too many restrictions might suppress financial growth (Batuo et al., 2018; Uzar et al., 2023).

Bekana (2023) examined the link and effect of financial development and governance quality using the quantile regression model (QRM), considering specific macroeconomic factors. The author included the general methods of moments (GMM) and general least squares models for bias and robustness checking, respectively. The system GMM estimator is widely used by scholars including Becerra et al. (2012), Girma & Shortland (2008), Grittersova (2022), and Khan et al. (2022) because it addresses the potential reverse causality between financial development (a dependent

variable) and the regressors. As a result, it enables the researchers to account for the impact of possible biases that are unique to each country (Arellano & Bover, 1995). Other scholars, like Gazdar and Cherif (2014), employed the fixed effects model (FEM) and random effects model (REM), where the Hausman test is performed for estimator selection. To address the endogeneity issue in the time series, Song et al. (2021) used the FMOLS regression findings to assess the long-term impact of corruption on financial development.

In summary, there is a lack of agreement among academics on the correlation between financial development and the quality of governance. One possible explanation for this might be the differences in the macroeconomic factors and governance quality across the nations studied; secondly, it could be related to the statistical methodology used. Some studies were conducted for developed nations such as European countries, China, and South Korea, while others were conducted for developing and emerging economies where the implementation of laws is inadequate and there are huge gaps between the income levels of these countries.

2.1.4 Control Variable (1) – Financial Inclusion

Ma et al. (2024) underscored financial inclusion as the availability of affordable financial services that are not only beneficial to individuals but also promote financial stability. Kim et al. (2018) also stated that one of the main drivers of economic development today is financial inclusion or the availability of financial services to low-income and marginalized groups in society at reasonable prices. According to earlier research, financial inclusion provides individuals and businesses with the same opportunities to easily obtain financial products and services at fair pricing; this

contributes to macroeconomic stability and assists countries in implementing more effective monetary policy (Oanh et al., 2023).

The findings of Cavoli and Gopalan (2023) indicated that financial inclusion can improve family access to and utilization of a wider variety of financial instruments and diversify consumption risk by lowering volatility in consumption. This is also supported by research from Kim et al. (2018) in that improved financial inclusion initiatives enable households to invest more in improving their assets and can raise household income in the long run. According to their research, a 1% rise in the percentage of the population using mobile devices increases household income by around 0.3%. As a result, a 1% increase in financial inclusion has a two-fold effect on family income. For example, the Ghanaian government has increased the provision of low-cost, high-quality financial services to lessen economic vulnerabilities (Twumasi et al., 2024).

According to the study conducted by Abel et al. (2018), to achieve sustainable development, low-income workers, women, youth, and other underprivileged groups must have access to suitable financial services. Certain interest groups, such as young people, women, SMEs, and rural and small-scale agricultural populations, desire to be involved in banking. People in rural regions find it difficult to access financial services and the Internet due to inadequate telecommunications and financial infrastructures (Álvarez-Gamboa et al., 2023). The same results were obtained from the study of Koomson et al. (2023) whereby men and urban residents have greater levels of financial inclusion than women and rural people. Unfortunately, across a panel of 140 countries, the scholars found that underprivileged households tend to be excluded from accessing financial services due to poor infrastructure and a lack of consumer protection regulations (Demir et al., 2022). In other words, disadvantaged people are unlikely to search for informal financial services in a country where financial inclusion is high. On the other hand, digital financial inclusion is a low-cost digital technique of providing regular financial services to formerly underserved groups (Tay et al., 2022).

On the other hand, Sahay et al. (2020) conducted a study on 52 emerging market and developing economies (EMDEs) and revealed that only digital financial inclusion has a positive impact on financial development, whereas the findings of conventional financial inclusion demonstrated otherwise. For instance, financial inclusion in African countries such as Zimbabwe, South Africa, and Nigeria is mainly driven by the diffusion of fintech, especially during the COVID-19 pandemic. This is aligned with the findings of Asongu and Le Roux (2017), where the authors found that financial inclusion is enhanced when the utilization of mobile, internet, and broadband increases across 49 sub-Saharan countries. Daud and Ahmad's (2023) research findings further suggested that, despite the well-acknowledged country-level variation, digital technology has a significant influence on improving financial inclusion. Mobile devices have become an essential tool for increasing financial inclusion in emerging countries due to their unique features such as compact size, customizable capabilities, and continual accessibility (Kim et al., 2018).

In essence, the provision of bank accounts varies greatly across developed and developing economies because of the lack of infrastructure in developing nations, which limits their access to financial services (Kim et al., 2018). Twumasi et al. (2024) mentioned in their study that mobile money technology has been widely accepted and used by developing countries, especially those in Africa. Banks are often significant players in the conversion of virtual mobile money into real money and the deposit of the remaining balance in clients' mobile money through the provision of trust accounts. Financial inclusion, together with stricter financial laws and fewer restrictions on banking operations, improves the performance of banks in countries that are developing (Koomson et al., 2023). Abel et al. (2018) discovered through 4000 in-person interviews conducted in Zimbabwe that when individuals' trust in financial services rises, their use of such services also increases accordingly, leading to an increase in financial inclusion. According to Cavoli and Gopalan's (2023) research, financial

inclusion allows families to employ more suitable financial instruments and expands their access to the official banking system and financial markets.

However, Chen et al.'s (2024) study indicated that there may be a reverse causal connection between the improvement of financial technology and the financial inclusion of village and township banks (VTBs). Moreover, the findings of their research indicated that financial technology advancements have a greater influence on enhancing financial inclusion in developed regions while having little influence in less developed locations. According to earlier research, only nations with extremely high levels of financial inclusion can increase macroeconomic volatility, and vice versa (Cavoli & Gopalan, 2023). Besides, the study of Chen et al. (2022) concluded that the growth of digital financial inclusion cannot proceed fully without the existing financial systems' strong base. According to research conducted by Oanh et al. (2023), financial market instability may result from a country's financial inclusion. A rapidly expanding credit supply and considerable market risks are all potential outcomes of financial inclusion, which might lead to rising inflation (García and José, 2016).

The study conducted by Chen et al. (2024) has proven that advancements in financial technology enhance financial inclusion by using the PSM approach and instrumental variable approach. In addition, Koomson et al. (2023) employed instrumental variables, two-stage least squares (2SLS), and ordinary least squares (OLS) with a sample size of 35,127 people who were at least 15 years old in Ghana. The results showed that males and urban residents had higher levels of financial inclusion than females and rural residents. According to prior research, financial inclusion will increase disadvantaged population groups' access to financial services. In that study, GMM, OLS, and PVAR methods were applied in 58 countries between 2004 and 2020 (Oanh et al., 2023). The previous study applied the dynamic system GMM estimator in 85 emerging and developing economies (EMDEs) between 1995 and 2017 to evaluate the results (Cavoli & Gopalan, 2023). Additionally, Jamil et al. (2023) gathered data in developing nations between 2004 and 2019 to investigate the possibility that financial inclusion might be

used as a policy instrument to solve social concerns and promote financial development. The scholars accomplish this by utilizing pooled ordinary least squares (OLS), fixed effects (FEM), and random effects (REM).

In short, scholars have yet to reach a consensus on the relationship between financial inclusion and financial development. This is mainly due to the discrepancy of proxies used in those studies, not to mention, that the financial inclusion levels vary greatly in different countries because of different levels of technology advancements.

2.1.5 Control Variable (2) – Financial Performance

Past studies investigating the relationship between financial performance and financial development have yielded varying results. Several past studies have indicated a positive relationship between financial performance and financial development. A well-functioning financial system, along with strong financial performance by firms and financial institutions such as banks is crucial for efficient resource allocation and contributing to overall financial development (Akimov et al., 2009; Murinde, 2012; Ongore & Kusa, 2013; Ozili & Ndah, 2021; Pradhan et al., 2023). For instance, research by Ongore & Kusa (2013) showed how important bank performance is to a nation's financial development. Their investigation based on the financial statements of all commercial banks in Kenya from 2001 to 2010, revealed that weak banking performance could hinder financial sector development. Poor financial performance may lead to runs, failures, and crises—conversely, investments prompted by returns foster financial development (Ongore & Kusa, 2013).

Financial institutions and financial markets exert a powerful influence on the financial development of a country (Čihák et al., 2012). According to George et al. (2013), banks primarily generate profits by earning interest on loans. When loans are more accessible at lower rates, banks are more likely to attract borrowers. Consequently, the presence of profitable banks is anticipated to be a characteristic of a well-established financial sector. To measure the profitability of financial institutions, return on asset (ROA), return on equity (ROE), and net interest margin (NIM) are widely used in the literature (Bikker & Vervliet, 2017; Le & Ngo, 2020; Ozili & Uadiale, 2017). These ratio-based financial performance measurements measure the efficiency of the financial institution of a country. More efficient institutions tend to be more profitable (Čihák et al., 2013).

According to Aduba et al. (2023), their findings suggested that all measures of profitability performance (ROA, ROE, and NIM) exert significant negative effects on financial development. However, their previous study indicated that traditional ratio-based performance metrics offer only a limited perspective, focusing more on short-term analyses of financial performance rather than capturing broader aspects of financial or market risk (Aduba et al., 2022). This is because the financial ratios will fluctuate with the business cycles (Aduba et al., 2022). For example, during economic recessions, the financial ratios will decline because financial institutions are facing more risks and challenges. Nevertheless, when the economy recovers, the financial institutions will generate more income thus the ratios will increase (Čihák et al., 2012). Therefore, financial ratios focus more on the short term than the long term. Previous studies also explained that this situation occurs more in low-income countries than in high-income countries because high-income countries have more stable financial systems to overcome the risk (Younsi & Nafla, 2017). However, research conducted by Ricky-Okine et al. (2020) analyzed data from the World Bank spanning 37 countries in Sub-Saharan Africa from 2001 to 2016, revealing a positive correlation between bank profitability and financial development. Their findings indicate that a one percentage point rise in bank profitability results in a 0.19 percentage point increase in financial development.

Financial stability is a crucial aspect of any financial system, serving as a key indicator of its performance. This is supported by the study of Sarkar and Sensarma (2016) which stated that bank stability is crucial in driving financial development. According to Carvallo and Pagliacci (2016), stable banks make a positive impact on the advancement of the financial sector. To measure the stability of financial institutions, the Z-score is widely used (Aduba et al., 2022; Aduba et al., 2023; Čihák et al., 2013; Demirgüç-Kunt et al., 2018). The Z-score is utilized to assess the solvency risk inherent in financial institutions. While developing countries' markets typically exhibit higher levels of volatility compared to developed countries' markets, the disparity between the two is not deemed significant (Čihák et al., 2013). Both Aduba et al. (2023) and Aduba et al. (2022) have found significant positive correlations between the Z-score and financial development. Aduba et al. (2022) further observed that fintech advancements contribute to enhanced financial development in nations with stronger financial stability. A higher Z-score typically translates to increased banking stability.

To sum up, prior scholars have predominantly highlighted a positive correlation between financial sector performance and financial development. However, consensus on this relationship remains elusive among scholars. For example, certain studies have revealed a negative association between financial profitability and financial development. This discrepancy arises because financial performance metrics, primarily based on net income, may fluctuate in tandem with business cycles. Nonetheless, alternative perspectives from scholars and metrics such as the Z-score indicate a positive relationship between financial performance and financial development.

2.2 Theoretical Framework

In this section, comprehensive discussions on some prominent theories developed by previous scholars that can support the relationship between financial development and its drivers – fintech penetration and governance quality, are provided. The theories studied include the (1) theory of "technological spillover"; (2) financial market imperfections theory; (3) institutional theory; and (4) law and finance theory.

2.2.1 Theory of "Technological Spillover"
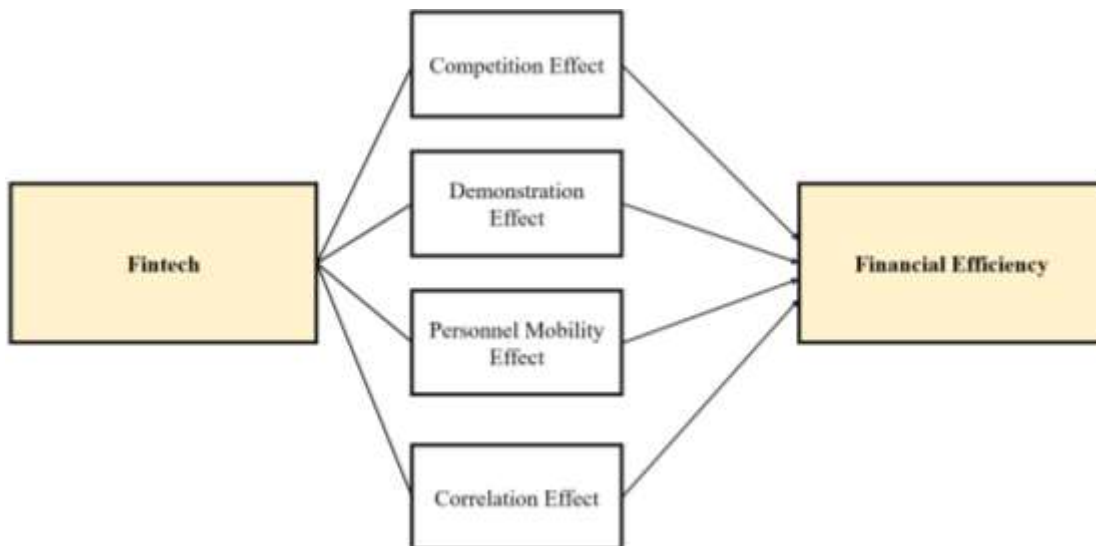
Figure 2.1. Theoretical framework of fintech and financial efficiency. Adapted from Wu, Y. H., Bai, L., & Chen, X. (2022). How does the development of fintech affect financial efficiency? Evidence from China. *Economic Research-Ekonomska Istraživanja, 36*(2), 2980-2998.

The theory of "technological spillover" implies that despite facing risks in technological advancement, firms can constantly learn from the successes and failures of peers. Subsequently, the firms should be able to adopt innovations timelier with the knowledge learned. Hence, this increases the possibility of larger-scale technology adoption in the market (Tseng, 2022). Figure 2.1 illustrates that the theory of technological spillover is sufficient to explain fintech can affect financial efficiency in four ways: (1) competition effect; (2) demonstration effect; (3) personnel mobility effect; and (4) correlation effect (Wu et al., 2022). Back to the context of financial development, fintech adoption does not only enhance employees' technical knowledge, but it also promotes financial inclusion and generally eliminates financial intermediation (Rahman et al, 2023). The author underscored technology as an affordable and simple alternative to actual bank branches. This is aligned with the findings of Aduba et al. (2023) and Zaghlol et al. (2021) that fintech is of utmost importance in propelling financial inclusion and hence, driving financial development. Therefore, it is worth employing this theory to study how fintech impacts financial development.

2.2.2 Financial Market Imperfections Theory
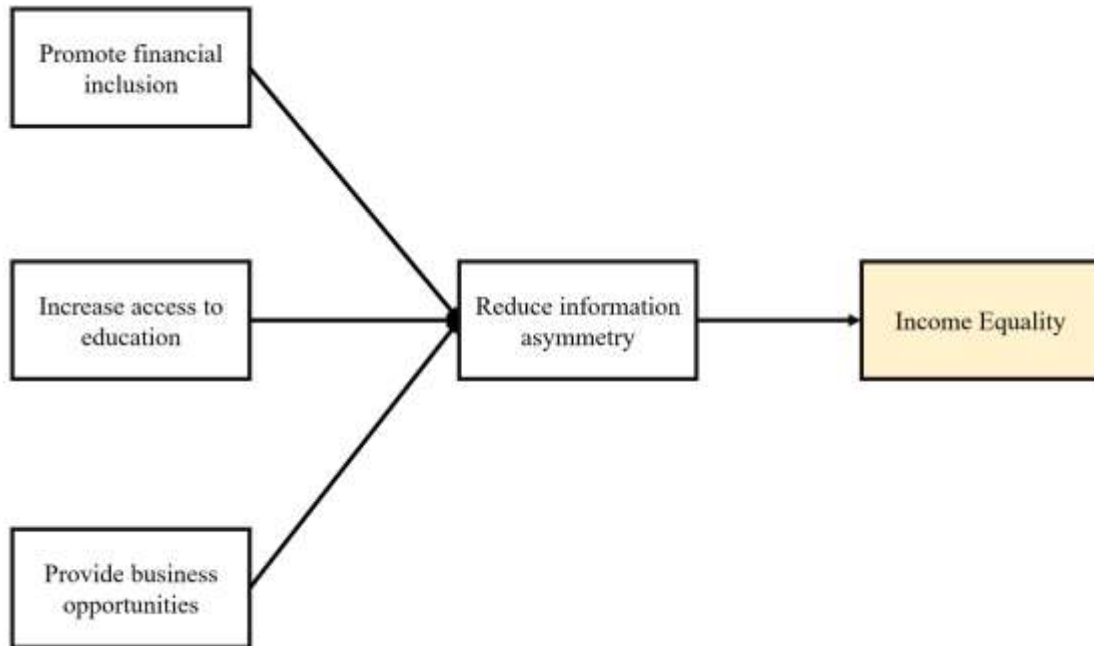
Figure 2.2. Information asymmetry theory. Adapted from Banerjee, A. V., & Newman, A. F. (1993). Occupational choice and the process of development. *Journal of Political Economy, 101*(2), 274-298.

Banerjee and Newman (1993), and Galor and Zeira (1993) suggested that it is almost impossible for poor people to escape poverty due to information asymmetries, which means that poor people tend to have limited access to formal financial services. Galor and Zeira (1993) explained in their model that it is difficult for underprivileged households to invest in their education due to the imperfect credit markets, preventing them from borrowing. Likewise, the model of Banerjee and Newman (1993) highlighted that poor households only have limited access to capital borrowing for business startups due to credit market imperfections. Hence, these models imply that the greater the financial inclusiveness, the lower the poverty level by increasing access to education and business opportunities for low-income households. Although this

theory has proven that greater financial inclusiveness can reduce income inequality, the nexus between financial inclusion and financial development is not clearly defined. Not to mention, fintech is expected to promote financial inclusion in developing nations, thus, it is worth investigating how financial inclusion and fintech penetration can impact financial development.

2.2.3 Institutional Theory
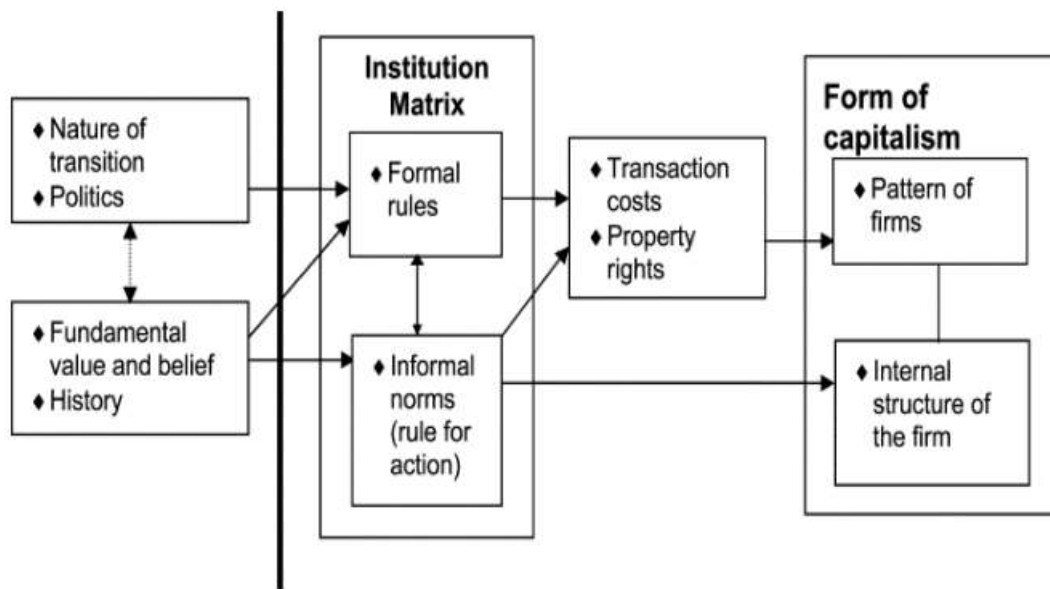
Figure 2.3. Institutional theory. Adapted from North, D. C. (1981). *Structure and change in economic history*. New York.

Institutional theory highlights that the social and economic development of a nation depends on institutional quality. North (1981) defined institutions as "rules of the game in a society, or more formally, humanly devised constraints that shape human intervention". Major institutions in the field of political, economic, and legal play crucial roles in ensuring the establishment and enforcement of rules and regulations

(Bekana, 2023). Frunză (2011) further explained that the formal and informal rules implemented by the institutions are monitoring tools to ensure an efficient allocation of national resources and capital. Scholars widely employ the institutional theory and many studies have proven that strong institutions and effective institutional reforms help to propel financial development (Acemoglu & Johnson, 2003; Blackburn & Forgues-Puccio, 2010; Casson et al., 2010; Hasan et al., 2009; Huang, 2010). Therefore, this theory can be integrated into this study to examine the impact of governance quality on financial development.

2.2.4 Law and Finance Theory
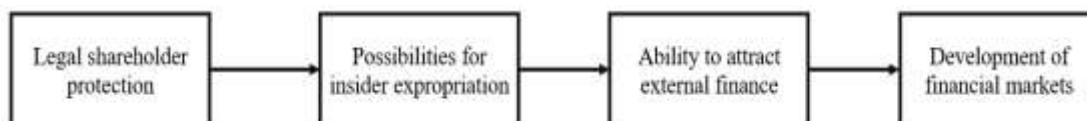
Figure 2.4. Law and finance theory. Adapted from Porta, R. L., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. *Journal of Political Economy, 106*(6), 1113-1155.

Porta et al. (1998) introduced the law and finance theory which helps to explain today's international differences in financial systems by referring to the differences in the legal traditions. The theory holds that a nation's efforts in protecting private property rights, support financial contracting, and enforcement of investor protection laws. This is of utmost importance as the nation's attachment to protecting private investors will affect the savers' willingness to invest, hence, giving impacts to the financial market development (Beck et al., 2003; Beck & Levine, 2005).

2.2.5 Selection of Theories

In short, four prominent theories have been explained in detail in the theoretical framework section. After careful and thorough contemplation, two theories namely: (1) the financial market imperfections theory; and (2) institutional theory are selected to construct a conceptual framework because they are the most relevant theories for this study. Since we will be investigating how fintech penetration can foster digital financial inclusion, ultimately promoting financial development in developing nations, the former theory can adequately explain the mechanisms in a financial context. On the other hand, the latter theory applies to the political stability study since this will be the measure for the governance quality variable.

2.3 Conceptual Framework
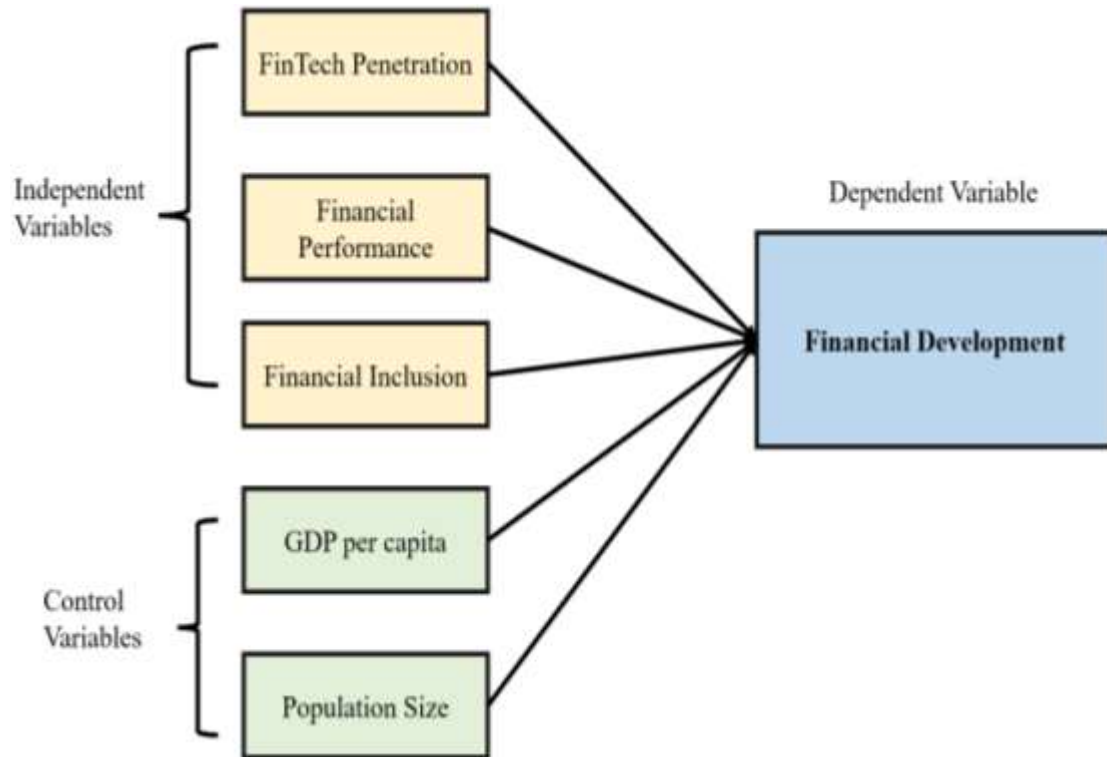
Figure 2.5. Conceptual framework of previous study on fintech penetration. Adapted from Aduba, J. J., Asgari, B., & Izawa, H. (2023). Does fintech penetration drive financial development? Evidence from panel analysis of emerging and developing economies. *Borsa Istanbul Review, 23*(5), 1078-1097.

Figure 2.5 is the conceptual framework developed by Aduba et al. (2023) and they concluded that the impact of fintech penetration is greater in nations with lower financial inclusion and financial sector performance.
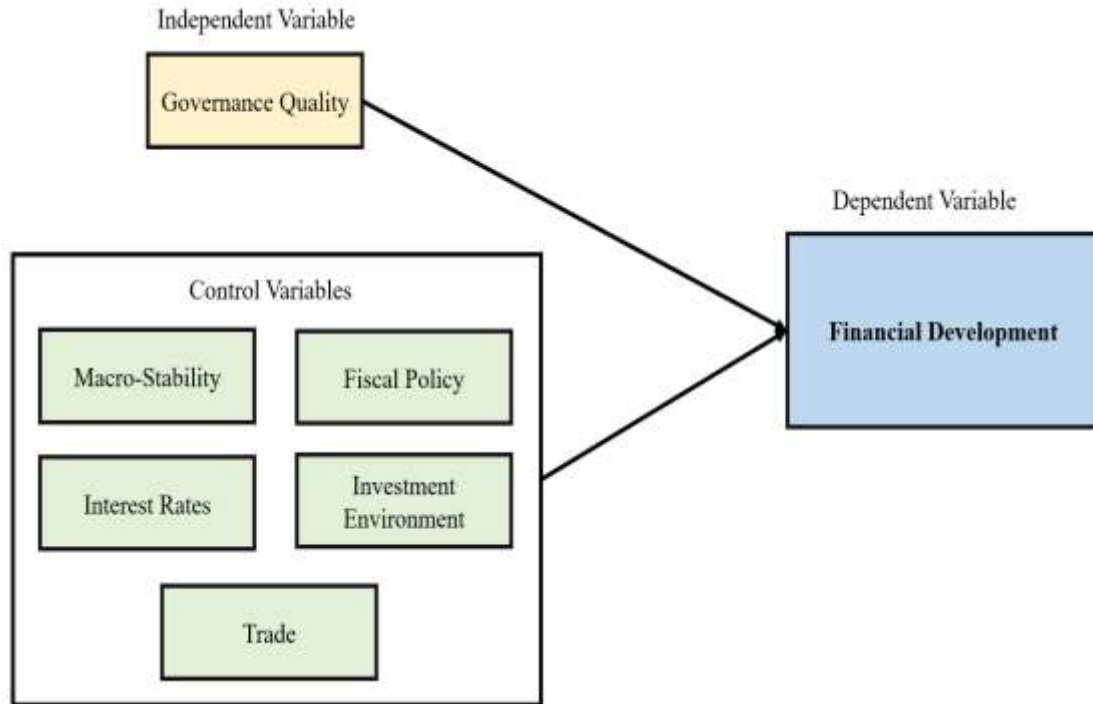
Figure 2.6. Conceptual framework of previous study on governance quality. Adapted from Bekana, D. M. (2023). Governance quality and financial development in Africa. *World Development Sustainability,* *2*(1), 1-14. https://doi.org/10.1016/j.wds.2023.100044

Figure 2.6 is the conceptual framework developed by Bekana (2023) and the author concluded that governance quality has a positive impact on financial development in African countries.

After analyzing the prominent theoretical frameworks and conceptual frameworks developed by numerous scholars, a conceptual framework is constructed for this study as displayed in Figure 2.7.
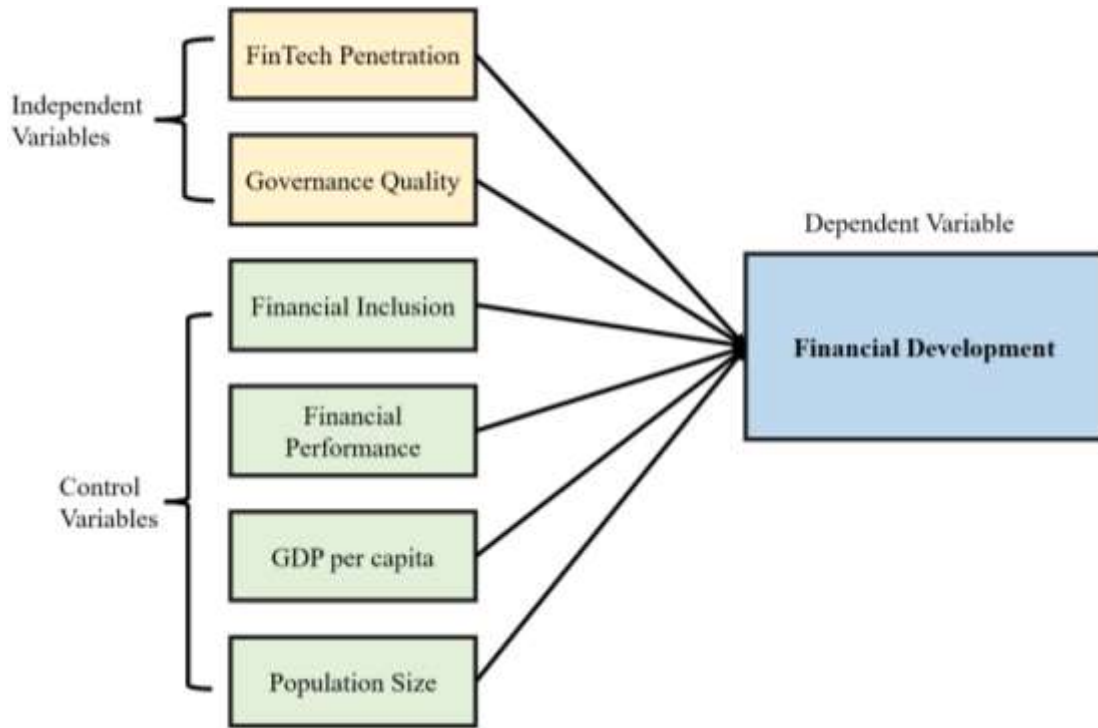
Figure 2.7. Conceptual Framework.

Many previous studies have delved into investigating the factors affecting financial development by including numerous determinants such as fintech penetration, financial inclusion, financial performance, and governance quality as shown in Figures 2.5 and 2.6. However, these studies require further discussion and examination because no scholars have studied both fintech penetration and governance quality simultaneously. Thus, a conceptual model is developed as shown in Figure 2.7 to further examine the factors affecting financial development in 64 low-income and lower-middle-income countries from 2011 to 2021. Two independent variables to be examined are (1) fintech penetration; and (2) governance quality. The remaining four control variables are (1) financial inclusion; (2) financial performance; (3) GDP per capita; and (4) population size. Hence, this framework will be used to investigate the accuracy of the inferences. In the subsequent section, hypotheses are constructed based on this framework.

2.4 Hypothesis Development

2.4.1 Financial Development and FinTech Penetration (IV)

Firstly, fintech penetration is statistically significant to financial development. The adoption of fintech into the financial sector has proven to be a catalyst for development, especially in emerging economies with low financial inclusion, low-cost efficiency, and low operation efficiency (Abbasi et al., 2021; Aduba et al., 2023; Basten & Ongena, 2020; Demir et al., 2022; Zaghlol et al., 2021). Several studies stated that financial development in developing countries can be fostered through the implementation of appropriate policies to stimulate financial technology innovation, especially in nations that have inadequate financial infrastructure and poor financial performance (Aduba et al., 2022; Muganyi et al., 2022). In the EMDEs, the findings found that fintech positively drives financial development. The fintech service innovations play a crucial role in enhancing the financial accessibility of underbanked, unbanked, and financially excluded populations (Aduba et al., 2022; Ozili, 2018). Besides that, several research also found that the development of fintech fosters both financial accessibility and integration, hence driving financial development (Cole et al., 2019; Jagtiani & Lemieux, 2018; Leong et al., 2017). Thus, the first hypothesis proposed for this study is:

H1: There is a significant relationship between fintech penetration and financial development in 64 low-income and lower-middle-income countries.

2.4.2 Financial Development and Governance Quality (IV)

Secondly, governance quality is statistically significant to financial development. Higher institutional quality is proven to promote liberalization because the legal and political institutions are the major players who enforce the rules and regulations. In essence, the regulations imposed could be favorable or unfavorable to the financial activities in the markets (Bekana, 2023; Casson et al., 2010). On top of that, many studies revealed that political stability can also strengthen investors' and depositors' confidence to take part in the financial markets (Becerra et al., 2012; Chletsos & Sintos, 2024; Gazdar & Cherif, 2014; Khan et al., 2022; Levine,1999). In developed countries that feature better governance, the investors and creditors are well-protected by the solid rule of law, therefore, it is undoubtedly crucial for a nation with a well-developed financial system to have strong and secured legal structures (Grittersová, 2022; Lu & Yao, 2009). Besides that, other researchers also found that improved governance quality helps to drive financial development in developing economies such as African and Middle East countries (Appiah-Otoo et al., 2022; Bekana, 2023; Gazdar & Cherif, 2014; Khan et al., 2022). Thus, the second hypothesis proposed for this study is:

H2: There is a significant relationship between governance quality and financial development in 64 low-income and lower-middle-income countries.

2.4.3 Financial Development and Financial Inclusion (CV)

Thirdly, financial inclusion is statistically significant to financial development. Financial inclusion enables households to access various financial instruments such as ATMs where they can withdraw cash, and digital platforms where they can perform online banking or transactions of mobile money (Cavoli & Gopalan, 2023; Twumasi et al., 2024). Therefore, the ease of accessing financial services can foster financial stability, ultimately promoting financial development. This can be supported by the findings of EMDEs, especially in African and Sub-Saharan countries (Asongu & Le Roux, 2017; Sahay et al., 2020). The increasing adoption of digital financial services and mobile phones during the COVID-19 pandemic suggested that financial inclusion in emerging and developing countries increased dramatically. Moreover, Koomson et al. (2023) reported that bank performance in developing nations improves significantly when financial inclusion becomes higher, coupled with appropriate financial policies. Thus, we hypothesize that there is a significant relationship between financial inclusion and financial development in 64 low-income and lower-middle-income countries.

2.4.4 Financial Development and Financial Performance (CV)

Fourthly, financial performance is statistically significant to financial development. The indicator of financial performance is the profitability of the financial institutions, which represents the efficiency and stability of the institutions (Bikker & Vervliet, 2017; Ongore & Kusa, 2013). Therefore, financial performance has a positive impact on financial development. Aduba et al. (2022) reported that fintech plays a crucial role in promoting financial development and this relationship between the variables is especially strong in countries with sturdy financial systems. In other words, financial

development in countries with exceptional financial performance is optimistic and fintech adoption can further intensify the good prospects. Therefore, we hypothesize that there is a significant relationship between financial performance and financial development in 64 low-income and lower-middle-income countries.

2.4.5 Financial Development and GDP per Capita (CV)

GDP per capita is a widely used macroeconomic control variable in the field of financial development. In the studies of Aduba et al. (2023) and Bekana (2023), this control variable is statistically significant and positively related to financial development. Financial development can be defined as national savings therefore, the higher the income per capita, the greater the savings ability. Thereby, fostering financial development. Similarly, we hypothesize that there is a significant relationship between GDP per capita and financial development in 64 low-income and lower-middle-income countries.

2.4.6 Financial Development and Population Size (CV)

Population size is another widely employed control variable in the field of financial development. In the studies of Aduba et al. (2023) and Bekana (2023), this control variable is statistically significant and positively related to financial development. Similarly, we hypothesize that there is a significant relationship between population size and financial development in 64 low-income and lower-middle-income countries.

2.5 Conclusion

The review of literature on the dependent variable – financial development; two independent variables including fintech penetration and governance quality; and four control variables – financial inclusion, financial performance, GDP per capita, and population size, are discussed comprehensively in this chapter. Furthermore, a detailed study of numerous theoretical frameworks has been provided. After a thorough study and understanding, a conceptual framework is constructed, and the hypotheses of this study are further developed based on the frameworks.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

In Chapter Three, a detailed research methodology will be discussed. The research design and data collection method are first stated. Next, the sources of data for all variables are stated in detail, followed by a research framework and an econometrics model. Lastly, the Generalized Method of Moments (GMM) which is chosen as the estimation method in this study will be explained.

3.1 Research Design / Data Collection Method

A research design is a detailed strategy created to answer a research problem (Zikmund et al., 2013). This study examines the effects of fintech penetration and governance quality on financial development in 64 low- and lower-middle-income countries between 2011 and 2021. The categorization of countries for this study is according to the classification of the World Bank Atlas methodology. Countries with a per capita GNI of $1,135 or less are classified as low-income, and others with a per capita GNI of $1,136 to $4,465 are classified as lower-middle income (World Bank, 2023).

Besides that, the use of secondary data enables considerably bigger access to more diverse samples than we might otherwise obtain via our collection efforts, broadening

the scope of our research. However, the choice of the period is limited by the availability of the data and the developments in the world economy. This is because fintech penetration only started in the digitalized era; therefore, the data available began from 2011 onwards. Additionally, adding financial inclusion from various countries to the study will boost the quantity of observations and econometric results' dependability (Uzar et al., 2023).

Lastly, in this study, the generalized methods of moments (GMM) model is used to analyze the dynamic relationship between financial development, fintech penetration, and governance quality, together with the control variables – financial inclusion, financial performance, GDP per capita, and population size in the sampled countries. By merging observable economic data with population-moment circumstances, the GMM model helps to solve the endogeneity problem of all explanatory factors and estimate unknown parameters (Daud & Ahmad, 2023).

3.2 Source of Data

In this study, a balanced panel of data comprising 64 countries is developed. Some of the countries have been excluded from the study since the data extracted from the World Bank are incomplete or missing, especially in low-income countries. Besides, the study encompasses data from the period spanning 2011 to 2021, except for the fintech penetration indices since only data for 2011, 2014, 2017, and 2021 can be obtained from the data source.

Table 3.1:

Data Sources and Variable Definitions

Variables	Variable description and measurement	Literature	Data sources
Financial development (DV)	Domestic credit to private sector (%GDP)	Aduba et al. (2023), Becerra (2012), Olayungbo & Quadri (2019)	The World Bank: Global Financial Development & World Development Indicators
Fintech penetration (IV)	ATMs per 100,000 adults, Mobile money account (% age 15+)	Aduba et al. (2023), Rahman et al. (2023), Kanga et al. (2021)	The World Bank: Global Financial Development & Global Financial Inclusion
Governance quality (IV)	Political stability and absence of violence/terrorism	Bekana (2023), Chletsos & Sintos (2024)	The World Bank: Worldwide Governance Indicators
Financial inclusion (CV)	Commercial bank branches (per 100,000 adults)	Demir et al. (2020), Kanga et al. (2021), Kim et al. (2018)	The World Bank: Global Financial Inclusion & World

			Development Indicators
Financial performance (CV)	Return on equity (ROE)	Čihák et al. (2013), Demirgüç-Kunt et al. (2008)	The World Bank: Global Financial Development
Macroeconometric Variables (CV)	GDP per capita, Population size	Aduba et al. (2023), Bekana (2023)	The World Bank: World Development Indicators

3.2.1 Financial Development

Financial development is defined as providing liquidity, information production, cost efficiency, and resource mobilization (Otchere et al., 2017). To assess the financial development at a country level, the ratio of private credit as a percentage of GDP is employed in this study since it provides the most direct indication of private credit to measure financial development and is widely used in the research (Becerra et al., 2012; Bekana, 2023; Rahman et al., 2023). The study by Levine (1999) stated that such a ratio separates the credit issued to the private sector from the credit issued to the government, public enterprise, etc. This ratio does not only measure the amount of investment, but it also measures its quality. In short, it is a measure of the performance of the financial institutions of the countries. The data is extracted from the World Development Indicator of the World Bank from 2011 to 2021 annually.

3.2.2 FinTech Penetration

Fintech can be defined as the application of new technological developments to the products and services of the financial sector. In this study, ATM (per 100,000) adults and mobile money accounts are utilized as the proxies for the level of fintech penetration, which mobile money account is employed in robustness checking to assess the validity of the findings. The data is extracted from the World Bank: Global Financial Development and Global Financial Inclusion and the data is only available for the years 2011, 2014, 2017, and 2021. The expected sign of fintech penetration with financial development is positive. Based on the research of Demir et al. (2022) and Muganyi et al. (2022), the adoption of fintech has contributed a positive impact on financial development by enhancing the operational efficiency of financial institutions.

3.2.3 Governance Quality

Governance quality is measured by gathering perceptions of households, businesses, and citizens regarding the quality of governance and institutions of the nations (World Bank, n.d.). The World Bank has introduced the Worldwide Governance Indicators, and the data are extracted for 2011-2021 annually. Out of the six indicators, political stability and the absence of violence or terrorism is chosen as the proxy of governance quality in this study. The expected sign of governance quality with financial development is positive. Based on the studies of Chletsos and Sintos (2024) and Grittersova (2022), a stable political environment tends to be accompanied by financial liberalization and democracy, hence, promoting financial development in developing nations.

3.2.4 Financial Inclusion

Financial inclusion is the availability of financial services whereby individuals can afford to access and utilize them (Ma et al., 2024). In this study, commercial bank branches (per 100,000 adults) from the World Bank: Global Financial Inclusion & World Development Indicators are chosen as the proxy of financial inclusion from year 2011 to 2021 on an annual basis. The expected sign of financial inclusion with financial development is negative. Based on the findings of Aduba et al. (2023) and Sahay et al. (2020), traditional financial inclusion hurts financial development because it is insufficient to promote financial growth in this digitalized era.

3.2.5 Financial Performance

Financial performance is defined as the efficiency and stability of the financial systems. It is measured by the efficiency ratios and stability ratios. Similarly, the data is obtained from the World Bank: Global Financial Development, and the profitability index – return on equity (ROE) is selected as the proxy of financial performance, from 2011 to 2021 annually. ROE is measured by the total income against the total shareholders' return. The expected sign of financial performance with financial development is positive. This relationship is supported by the results of Ongore and Kusa (2013) in that good financial performance indicates that the banks are allocating the resources efficiently, hence, fostering financial development.

3.2.6 Macroeconomic Variables

Following the study of Aduba et al. (2023), GDP per capita and population size are included in this study as control variables. Besides these authors, these two variables are widely used as control variables to consider the country-level specific variations in financial development. Rahman et al. (2023) stated that GDP per capita is used to indicate the level of economic growth in a country. Similarly, the expected signs of both control variables would be positive.

3.3 Research Framework
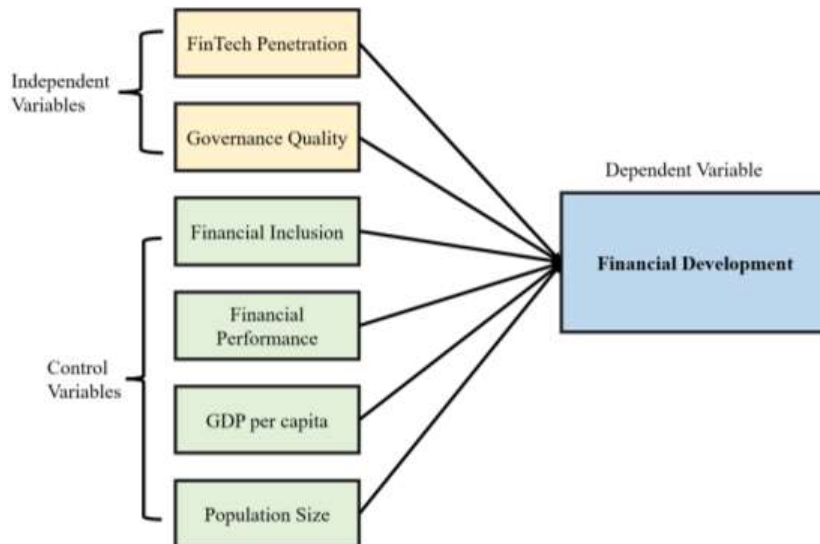
Figure 3.1. Research Framework.

According to our model, the expected relationship between fintech penetration and financial development shows a positive sign, indicating that the higher the level of fintech penetration, the greater the financial development will be (Aduba et al., 2023; Kanga et al., 2023; Leong et al., 2017; Ozili, 2018; Sahay et al., 2020). Besides, the governance quality has an expected positive contribution to financial development, suggesting that the higher the governance quality of a country, the greater its potential to foster financial development (Becerra et al. 2012; Chletsos & Sintos, 2024; Khan et al., 2022). Moreover, there is a positive expected relationship between financial performance and financial development, which means that in a country with a strong financial performance, financial development will become higher (Ongore & Kusa, 2013; Čihák et al., 2012). However, the relationship between financial inclusion and financial development has an expected negative sign because the proxy employed is a traditional financial inclusion indicator (Sahay et al., 2020). Lastly, GDP per capita and population have a positive relationship with financial development, indicating that the higher the level of GDP per capita and population result the greater the financial development will be (Aduba et al., 202; Kim et al., 2018).

3.4 Econometrics Model

(Model 1)

$$FD_{it} = \hat{\beta}_0 + \hat{\beta}_1 FinT_{it} + \hat{\beta}_2 Gov_{it} + \hat{\beta}_3 Controls_{it} + \hat{\beta}_4 FD_{it-1} + \varepsilon_{it}$$

Where:

Financial development (FD) = Domestic credit to private sector (% GDP)

Fintech penetration (FinT) = ATMs per 100,000 adults; Mobile money account (% age 15+)

Governance quality (Gov) = Political stability and absence of violence/terrorism

Control variables (Controls) = (1) Financial inclusion – Commercial bank branches (per 100,000 adults); (2) Financial performance – Return on equity (ROE); (3) GDP per capita; (4) Population size

i = 64 countries from low and lower-middle-income countries

t = 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021

3.5 Data Processing
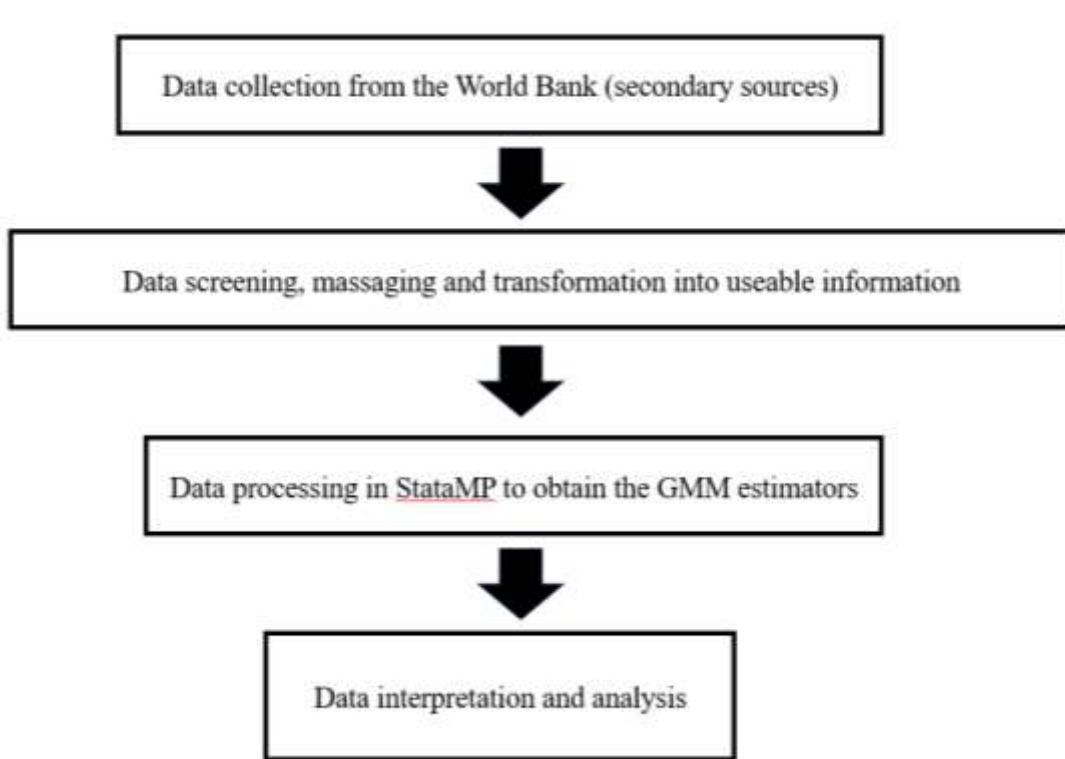
Figure 3.2. Data Processing.

3.6 Generalized Methods of Moments (GMM)

GMM is a statistical method employed in dynamic panel data models, particularly when data distribution is unknown, and the over-identification problem is present. It offers a consistent, asymptotically normal, and efficient parameter estimator by combining observed economic data with population moment conditions to estimate unknown parameters (Zsohar, 2010). Besides, GMM is considered more versatile than other estimation methods since it only requires fulfilling certain assumptions of moment conditions. The concept was first introduced by Andrews in 1999 and was subsequently extended by Andrews and Lu (2001), that all the correctly specified moment conditions should be selected while eliminating the invalid one.

Generally, sample statistics have a corresponding term in the population, such as the correspondence between the sample mean and the population predicted value. Next, the analogy principle is used to explain using the sample moments as the foundation for population parameter estimators. From the example shown by Zsohar (2010), where the mean μ of the population distribution is unknown and variance equal to 1, the population moment condition is stated as $E[x_i] = \mu$. By using the analogy principle, the method of moments (MM) estimator is formed as $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = \hat{\mu}_n$. Hence, the MM will be used to solve the equation for unknown parameters (Zsohar, 2010).

Besides, the population of moment conditions represents information that is implied by certain theories. Typically, researchers want to exploit as much information as possible. However, the MM estimator is limited to incorporate more moments than parameters. To estimate the parameters, researchers can only employ p number of moments but can lose the information contained in the conditions if q - p (> 0) additional moments are dismissed, where p is the number of unknown parameters and q is the number of moment conditions. In this situation, Hansen (1982) proposed a remedy which called

GMM. The GMM estimator allows information exploitation from the general population moment conditions form. When p = q, the result of GMM is the same as MM. In the situation of p < q, over-identification will occur. However, GMM allows researchers to estimate $\hat{\beta}$ which is closest to resolving the sample moment conditions (Zsohar, 2010).

3.6.1 One-Step and Two-Step GMM

The weighting matrix, $(Z'\Omega Z)^{-1}$, serves as a key element for achieving practical efficient GMM. In two-step GMM, is built upon the initial GMM parameter estimate, obtained from the first step, to further refine parameter estimation which is shown below (Roodman, 2009b).

First step: The weighting matrix, $A = (Z'\Omega Z)^{-1}$ is substituted with a sub-optimal weighting matrix, $A = (Z'HZ)^{-1}$, where H is an "estimate" of Ω based on a minimally arbitrary assumption about the errors, such as homoskedasticity. This yields the function, $\hat{\beta}_1 = (X'Z(Z'HZ)^{-1}Z'X)^{-1}X'Z(Z'HZ)^{-1}Z'Y$.

Second step: By using the $\hat{\beta}_1$ (one-step GMM), the optimal weighting matrix setting $A = (Z'\widehat{\Omega}_{\hat{\beta}_1}Z)^{-1}$ is reconstructed. The function is then constructed by replacing the optimal weighting matrix, $\hat{\beta}_2 = (X'Z(Z'\widehat{\Omega}_{\hat{\beta}_1}Z)^{-1}Z'X)^{-1}X'Z(Z'\widehat{\Omega}_{\hat{\beta}_1}Z)^{-1}Z'Y$.

According to Roodman (2009b), two-step GMM is both asymptotically efficient and robust in accommodating diverse patterns of heteroscedasticity and cross-correlation of the sandwich covariance estimator models. In contrast, one-step GMM is shown to be asymptotically inefficient. In past studies, researchers often employed one-step GMM due to concerns about two-step downward bias in the computed standard errors. However, the concern of this downward bias has been mitigated through the Windmeijer (2005) finite sample correction procedure. Therefore, considering this correction, two-step GMM is preferable to use as compared to one-step GMM (Roodman, 2009b).

3.6.2 Difference and System GMM

The difference and system GMM estimators for dynamic panels have become widely used. To isolate useful information, the estimators employ more sophisticated techniques while making fewer assumptions during the data generation process (Roodman, 2009b). Besides, both estimators are designed for "small T, large N" panels, and to fit the linear models which include a single dynamic dependent variable, additional controls, and fixed effects.

$$y_{it} = \alpha y_{i,t-1} + x'_{it}\beta + \varepsilon_{it}$$

$$\varepsilon_{it} = \mu_{it} + v_{it} \qquad (1)$$

$$E[\mu_i] = E[v_{it}] = E[\mu_i v_{it}] = 0$$

Where μ_{it} is fixed effect and v_{it} are idiosyncratic shocks

By employing GMM, the following assumptions need to be fulfilled:

i. Certain variables could be endogenously determined.

ii. Arbitrarily distributed fixed individual effects are possible which against the cross-sectional regression, where parameters can be identified with variation over time.

iii. The relationship exhibits a dynamic nature, indicating that current outcomes are influenced by past ones.

iv. The idiosyncratic disturbances may present unique patterns of heteroskedasticity and serial correlation.

v. The idiosyncratic disturbances are uncorrelated across individuals.

vi. Some of the regressors may not necessarily be strictly exogenous.

vii. Small T, Large N

viii. The only available instruments are those that depend on lags of the instrumented variables.

In (1), the disturbance term consists of two orthogonal components which are fixed effect μ_{it} and idiosyncratic shocks ν_{it}. Hence, (1) can be rewritten as:

$$\Delta \text{y}_{it} = (\alpha-1)\text{y}_{i,t-1} + x'_{it}\beta + \varepsilon_{it} \qquad\qquad (2)$$

However, dynamic panel bias is the problem in equation (1) which needs to be removed through different transformations of the data. There are two approaches of GMM to address the endogeneity problem. In difference GMM, it is so-called after the first-difference transformation to eliminate the fixed effects (Ullah et al., 2018). The second approach involves instrumenting $\text{y}_{i,t-1}$ and other endogenous variables that are uncorrelated with fixed effects, known as system GMM (Roodman, 2009b).

First-difference transform:

$$y_{it} = \alpha y_{i,t-1} + x'_{it}\beta + \varepsilon_{it}$$

⇩

$$\Delta y_{it} = \alpha \Delta y_{i,t-1} + \Delta x'_{it}\beta + \Delta v_{it} \qquad (3)$$

By applying the equation in (1) to transform the equation to (3), the fixed effects are eliminated. However, the lagged dependent variable, y_{it-1} still consists of an endogeneity problem, because the y_{it-1} , in term of $\Delta y_{i,t-1} = y_{it-1} - y_{it-2}$ is correlated with the $v_{i,t-1}$ in term of $\Delta v_{it} = v_{it} - v_{i,t-1}$. In addition, all predetermined variables in x which are not strictly exogenous turn into possibly endogenous variables since they can also be correlated with $v_{i,t-1}$. Other than that, it also magnifies gaps in the unbalanced panels. For instance, if a certain y_{it} is missing, it will further lead to the missing of both Δy_{it} and $\Delta y_{i,t-1}$. Hence, the weaknesses of first-difference transformation can further motivate second-order transformation by applying forward orthogonal deviations (Arellano & Bover, 1995).

In system GMM, it uses orthogonal deviations to mitigate potential data loss by subtracting the mean of all future available observations for a particular variable. It minimizes data loss because it can be computed for all observations for each individual, except for the last, regardless of the number of gaps (Roodman, 2009a). Besides, system GMM enhances difference GMM by conducting concurrent estimation in both differences and levels. This involves distinctly instrumenting the two equations (Roodman, 2009a). It transforms the instruments so that they become exogenous to the fixed effects, rather than transforming the regressors to eliminate the fixed effects by adding an assumption. This is valid by assuming that there is no correlation between changes in any instrumenting variable, w and the fixed effects. Where $E(\Delta w_{it}\mu_i) = 0$ for all i and t, $E(w_{it}\mu_i)$ is time-invariant, then $\Delta w_{it}\mu_i$ is considered a valid instrument for the variables in levels:

$$E(\Delta w_{i,t-1}\varepsilon_{it}) = E(\Delta w_{i,t-1}\mu_i) + E(w_{i,t-1}v_{it}) - E(w_{i,t-2}v_{it}) = 0 + 0 - 0 \quad (4)$$

This study emphasizes system GMM. While difference GMM is employed for purposes of comparison and robustness, it occasionally yields insignificant outcomes for certain variables, thus not always providing valuable insights. Therefore, we prioritize system GMM due to its ability to address core issues present in other models, leading to statistically significant outcomes (Khan et al., 2019).

3.6.3 GMM Diagnostics

When employing the Generalized Method of Moments (GMM) model, specific criteria must be satisfied to ensure the suitability of the econometric model. When autocorrelation exists in the error terms of a GMM model, it violates the assumption of independently and identically distributed error. This can lead to inaccurate statistical conclusions, biased standard errors, and inefficient parameter estimations. Hence, it becomes necessary to take into account this issue to ensure the accuracy of the results. Applying lags to endogenous variable values of instruments is one method to reduce autocorrelation. This allows for capturing the autocorrelation in the error terms and enhancing the efficiency of parameter estimates (Biørn, 2014). Strong exogeneity assumption is then to be tested using the Arellano-Bond test for no autocorrelation or no serial correlation. This test examines whether the error terms of various periods are uncorrelated under the null hypothesis which implies that lagged variables are not associated with the error term (Ullah et al., 2018). Roodman (2009b) also stated that the Arellano-Bond test serves to test the presence of autocorrelation in the idiosyncratic disturbance terms, denoted as v_{it}. The full disturbance is represented by the equation

$\varepsilon\_it=\mu\_it+v\_it$, which combines fixed effect and idiosyncratic shocks. Due to the fixed effects, a full disturbance is therefore frequently deemed to be autocorrelated.

The hypothesis statements for the Arellano-Bond test are presented as follows:

H_0: There is no serial correlation.

H_1: There is a serial correlation.

The hypothesis statements for the AR (1) are presented as follows:

H_0: There is a first-order serial correlation in the error term.

H_1: There is no first-order serial correlation in the error term.

The hypothesis statements for the AR (2) are presented as follows:

H_0: There is a second-order serial correlation in the error term.

H_1: There is no second-order serial correlation in the error term.

This research is expected to reject the null hypothesis in AR (1) and not reject the null hypothesis in AR (2).

3.7 Conclusion

To sum up, the methodology of this study is explained comprehensively in Chapter Three. The secondary research method is employed in this study and the data for all variables are collected from the World Bank. After data collection, data screening and data massaging are performed. Then, the data-generating process is performed through StataMP software. After a thorough study of the numerous estimation methodologies, a two-step system GMM is selected to address the characteristics of small T, and large N while tackling the autocorrelation issues to ensure that the results are robust.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In Chapter 4, a comprehensive analysis is conducted on the gathered data through descriptive statistics, hypothesis testing, and diagnostic checking. This study incorporates the empirical results of dynamic panel difference generalized method of moments (GMM) estimations for both independent variables and control variables. Next, diagnostic checking is carried out by performing the Arellano-Bond serial correlation tests. Additionally, this chapter provides detailed interpretations and presents the results generated from StataMP software. Lastly, a robustness check is performed to ensure that the results are reliable and consistent.

4.1 Descriptive Statistics

Table 4.1:

Summary Statistics of the Main Variables

Variables	Obs	Mean	Std. Dev.	Min	Max
private	242	28.55266	25.23238	0.0048891	152.9296
atm	221	16.51355	20.03062	0.3485469	97.17113

stability	256	25.46694	17.65306	0	88.95927
branches	224	9.613223	12.03362	0.409954	70.39719
roe	209	14.20194	8.702245	-31.74547	60.28109
gdp3	252	1.214705	3.809195	-22.92919	11.82322
population	256	5.26e+07	1.68e+08	684672.3	1.40e+09

Table 4.1 demonstrates the summary statistics for the indicators of dependent variables, independent variables, and control variables. The mean value of the proxy of financial development (private) is 28.55, with a standard deviation of 25.23, which demonstrates huge variations in country-level financial development. Similarly, the mean values of the proxies for fintech penetration (ATM) and governance quality (stability) are 16.51 and 25.47, respectively. The standard deviations also reflect high cross-countries variations which are supported by the large ranges between their minimum and maximum values. As for the control variables, the measures of financial inclusion, financial performance, and GDP per capita have lower mean and standard deviations as compared to the dependent and independent variables but they are still subject to country-level variations. Since the sampled countries are low-income and lower-middle-income countries, the national GDP levels should be approximately similar. Hence, the standard deviation of GDP is lower as compared to the other variables. Lastly, the population has the largest mean value and standard deviation because it is the actual total population measures instead of percentage growth measurements. Therefore, it produces larger values, unlike the other variables.

Table 4.2:

Correlation Matrix of Main Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) ln(private)	1.0000						
(2) ln(atm)	0.7171	1.0000					
(3) ln(stability)	0.1553	0.3681	1.0000				
(4) ln(branches)	0.5858	0.6805	0.3731	1.0000			
(5) ln(roe)	-0.0952	0.0721	0.0914	0.0059	1.0000		
(6) ln(gdp3)	0.1243	0.0370	0.2358	0.1111	0.0076	1.0000	
(7) ln(population)	0.1015	0.0450	-0.3804	-0.0112	-0.0874	0.0131	1.0000

Table 4.2 presents the pairwise correlation among all proxies of the variables and they reflect the anticipated relationship of the econometric models proposed. The pairwise relationships between the proxies of financial development, independent variables, and control variables are aligned with the hypotheses proposed in the earlier chapters.

4.2 Results from Dynamic Panel GMM Estimation

Table 4.3:

Results of Dynamic Panel GMM Estimation for ATMs (per 100,000 Adults)

	One-step System GMM	Two-step System GMM
	(1)	(2)
lprivate	1.000***	1.000***
	(1812930.29)	(5252310.88)
latm	0.00000116***	0.000000617***
	(3.73)	(6.56)
lstability	0.00000329***	0.00000317***
	(5.19)	(14.61)
lbranches	-0.00000160***	-0.000000925***
	(-2.98)	(-5.94)
lroe	0.000000778**	0.00000189***
	(2.28)	(6.06)
lgdp3	0.0000181***	0.00000320***
	(10.44)	(6.59)
lpopulation	0.00000212***	0.00000216***

	(5.18)	(15.64)
constant	-0.0000990***	-0.0000585***
	(-10.46)	(-16.41)
Observations	182	182
No. of instruments	24	17
No. of countries	64	64
AR (1)	Rejected	Rejected
AR (2)	Do not reject	Do not reject

Note: *t* statistics are shown in parentheses. * indicates significant level at 10%, ** indicates significant level at 5% and *** indicates significant level at 1%.

Table 4.3 demonstrates the results of the dynamic panel GMM estimations which are generated by using the StataMP software. In this study, one-step and two-step system GMM are employed to obtain the findings. The system GMM was developed by Arellano and Bover (1995) and Blundell and Bond (1998), and this method is useful in eliminating biases. In essence, system GMM is an improved version of difference GMM by adding additional moment restrictions. This is because Blundell and Bond (1998) explained that the latter can easily become biased when the series is highly persistent. This makes the difference GMM less reliable because the explanatory variables appear to be less reliable in explaining the dependent variable when the lagged levels of the series exhibit a weak correlation with the following first differences. Nevertheless, the lagged first differences can be applied as instruments in the level equations in the system GMM. Thus, this study focuses on the results obtained from the system GMM estimation, and the two-step system GMM model is chosen to construct the econometric model as Roodman (2009b) stated that two-step GMM is more asymptotically efficient and robust.

Financial development (lprivate) is the dependent variable of this study, and it is measured by the domestic credit to the private sector (% GDP), which means that the greater the index, the higher the level of financial development. Firstly, under the two-step system GMM, fintech penetration (latm) is measured by ATMs per 100,000 adults which means that the more adults have access to ATMs, the greater the fintech penetration in the region. Based on the results in Table 4.3, fintech penetration (latm) has a significant and positive relationship with financial development (lprivate) at a significant level of one percent. In other words, with an increase of one percent in ATM indicators, on average, financial development index (lprivate) increases by 0.000000617 percent, holding other variables constant. This means that fintech penetration is a driver of financial development. This is consistent with the findings of various prominent studies such as Aduba et al. (2023) and Kanga et al. (2021). Some possible reasons for this result are that fintech can facilitate the operational efficiency of financial institutions and eliminate shadow activities such as tax evasion. Hence, fintech penetration is one of the main drivers of financial development.

Secondly, governance quality (lstability) is measured by political stability and the absence of violence or terrorism index. The higher the index, the better the governance quality of a nation based on the perception of individuals and businesses (The World Bank, 2024). Table 4.3 shows that governance quality (lstability) is statistically significant with financial development (lprivate), and it demonstrates a positive association between the two variables, at a significant level of one percent. On average, when the index of political stability increases by one percent, the financial development indicator (lprivate) increases by 0.00000317 percent, ceteris paribus. This outcome is aligned with the results of Bekana (2023) and Chletsos and Sintos (2024) as the authors argued that a politically stable environment is beneficial for financial development because it increases the incentives for the economic agents to engage in investment, borrowing, and deposit activities.

Thirdly, financial inclusion (lbranches) is statistically and negatively significant with financial development (lprivate) at a one percent significant level. Financial inclusion (lbranches) is a control variable measured by the commercial bank branches (per 100,000 adults). This means that as the financial inclusion index increases by one percent, on average, the financial development index decreases by 0.000000925 percent, by holding other variables constant. Thus, a greater financial inclusion will hinder financial development. This finding complements the outcome of Aduba et al. (2023) and Sahay et al. (2020) in that increasing traditional financial inclusion alone is not effective in fostering financial development.

Fourthly, financial performance (lroe) is another control variable measured by the return on equity (ROE) of the financial institutions in the countries. In Table 4.3, financial performance (lroe) is statistically significant and positively correlated to financial development (lprivate) at a one percent significant level. For every one percent increase in ROE, on average, the financial development index will increase by 0.00000189 percent, ceteris paribus. In other words, financial sector performance is an important determinant in driving financial development. Our finding is supported by Ongore and Kusa's (2013) study. The authors asserted that the performance of financial institutions especially banks plays a vital role in allocating capital and resources. If the financial resources are allocated efficiently, the financial systems will be more stable and liquid. This will strengthen the confidence of the economic agents such as investors and savers, hence fostering financial development.

Fifthly, GDP per capita (lgdp3) is statistically significant and positively correlated to financial development (lprivate). As GDP per capita increases by one percent, on average, the financial development index increases by 0.00000320 percent, ceteris paribus. It is commonly used as a control macroeconomic variable in studies related to the financial development field (Aduba et al., 2023; Bekana, 2023). Our result is consistent with the outcome of Ehigiamusoe et al. (2021) in that GDP enhances financial development. This is because firms and households in countries with higher

GDP tend to have greater demand for financial products and services, which ultimately stimulates the financial system of the countries.

Last but not least, population size (lpopulation) is statistically significant and positively correlated to financial development (lprivate) at a one percent significant level. As the population size (lpopulation) increases by one percent, on average, the financial development index (lprivate) increases by 0.00000216 percent, by holding other variables constant. It is commonly used as a macroeconomic variable in studies related to the financial development field. Our findings are also consistent with the outcome of Aduba et al. (2023) and Bekana (2023).

4.3 Diagnostics Tests

AR (1) and AR (2) are the diagnostic tests run in the model. The results in Table 4.3 indicate that both AR (1) of the one-step and two-step system GMM have rejected the null hypothesis. This suggests that the first-order serial correlation is available in the model. The significance of AR (1) is expected to occur because, in a dynamic panel model, period t+1 variables can be affected by period t variables when there is a presence of lagged dependent variables or lagged error terms. Nevertheless, AR (2) of Models (1) and (2) does not reject the null hypothesis which means that second-order serial correlation is available in the model. AR (2) is deemed to be significantly greater than AR (1). This is because AR (2) considers the effects of the error terms in AR (1) as well. To sum up, autocorrelation problems and model misspecification are absent from the models therefore, both Models (1) and (2) pass the diagnostic tests.

4.4 Robustness Check

Table 4.4:

Results of Dynamic Panel GMM Estimation for Mobile Money Account (% Age 15+)

	One-step system GMM	Two-step system GMM
	(1)	(2)
lprivate	1.000***	1.000***
	(3498551.49)	(11931871.84)
lmobile	0.00000198***	0.000000727***
	(4.00)	(11.82)
lstability	0.00000232***	0.000000536***
	(7.45)	(4.41)
lbranches	-0.000000488*	-0.000000192***
	(-1.96)	(-2.66)
lroe	0.00000209**	0.00000105***
	(2.53)	(4.32)
lgdp3	0.00000299***	0.00000576***
	(3.05)	(18.05)

lpopulation	0.00000218***	0.000000307***
	(12.45)	(5.11)
constant	-0.0000638***	-0.0000300***
	(-14.44)	(-18.98)
Observations	153	153
No. of instruments	31	21
No. of countries	64	64
AR (1)	Rejected	Rejected
AR (2)	Do not reject	Do not reject

Note: *t* statistics are shown in parentheses. * indicates significant level at 10%, ** indicates significant level at 5% and *** indicates significant level at 1%.

A robustness check is conducted in this study to (1) investigate the behavior of the estimations of the "core" regression coefficients when regressors are added or removed from the regression specification (Lu & White, 2014); (2) determine the veracity of the findings and identify misspecifications. In this study, the robustness check alters the proxy for fintech penetration – from ATMs per 100,000 adults to mobile money accounts (% age 15+) – while maintaining other variables constant. This is because mobile financial services are crucial to the fintech field as individuals may obtain financial services through their phones and can access new financial services that were previously not accessible to them (Kim et al., 2018).

In Table 4.4, the results of mobile money accounts (lmobile) reveal a significant and positive relationship with financial development (lprivate) at a significant level of one

percent. This is consistent with the findings obtained from Table 4.3, where the proxy of fintech is ATM penetration. This means that with an increase of one percent in mobile money accounts, on average, financial development index (lprivate) will increase by 0.000000727 percent, by holding other variables constant. The study conducted by Rahman et al. (2023) demonstrated that the utilization of Internet services and mobile phones for online payments contributes to the financial development of developing countries.

Additionally, the results of the other variables also coincide with the outcome in Table 4.3. Governance quality (lstability), financial performance (lroe), GDP per capita (lgdp3) and population size (lpopulation) are significantly and positively correlated to financial development (lprivate). Firstly, when the index of political stability increases by one percent, on average, the financial development indicator (lprivate) increases by 0.000000536 percent, ceteris paribus. Secondly, when the index of financial performance (lroe) increases by one percent, on average, the index of financial development (lprivate) increases by 0.00000105 percent, by holding other variables constant. Thirdly, on average, when GDP per capita (lgdp3) increases by one percent, the index of financial development increases by 0.00000576 percent, ceteris paribus. Fourthly, as the population size (lpopulation) increases by one percent, on average, the financial development index increases by 0.000000307 percent, by holding other variables constant. On the other hand, financial inclusion (lbranches) has a significant and negative relationship with financial development (lprivate). On average, as the financial inclusion indicator (lbranches) increases by one percent, the financial development indicator decreases by 0.000000192, ceteris paribus. In conclusion, the findings in this study are robust and reliable because the results from Table 4.4 are strongly consistent with the results from Table 4.3 when the proxy of fintech is modified.

4.5 Conclusion

The summary statistics and pairwise correlation of the variables are displayed in Table 4.1 and Table 4.2, respectively. Next, the findings of the empirical model obtained from the dynamic panel GMM estimations are presented in Table 4.3 and Table 4.4. Under the system GMM estimation method, the findings reveal that all the independent variables and control variables are statistically significant with the dependent variable at a significant level of one percent. Besides that, comprehensive interpretations have been provided for all the independent variables and control variables, supported by past literature. In essence, the outcomes are consistent with the theories proposed by previous studies as explained in Chapter 2. A diagnostic check is performed, and it has proven that the autocorrelation issue is absent from the model. Lastly, a robustness check is performed with an alternative proxy of fintech penetration. The results are consistent with the original model therefore, it is a strong independent variable to explain the dependent variable. Further implications and discussions will be explained in Chapter 5.

CHAPTER 5: DISCUSSION AND CONCLUSION

5.0 Introduction

Firstly, a summary table of the inferential analysis is presented. Secondly, implications for policymakers are discussed based on the findings obtained. Thirdly, the constraints and limitations of this study are identified. Lastly, constructive recommendations are provided for future researchers to improve their future studies.

5.1 Summary of Statistical Analysis

Table 5.1:

Summary of the Statistical Findings

Variables	Proxies	T-statistics	P-value	Results
	Independent Variables			
Fintech penetration	ATMs per 100,000 adults	6.56	0.0000	Significant
Governance quality	Political stability and absence of violence	14.61	0.0000	Significant

	Control Variables				
Financial inclusion	Commercial bank branches (per 100,000 adults)	-5.94	-0.0000	Significant	
Financial performance	Return on equity (ROE)	6.06	0.0000	Significant	
GDP per capita	-	6.59	0.0000	Significant	
Population size	-	15.64	0.0000	Significant	

According to Table 5.1, two independent variables namely: (1) fintech penetration; and (2) governance quality are statistically significant to financial development. The four control variables: (1) financial inclusion; (2) financial performance; (3) GDP per capita; and (4) population size employed in the model also demonstrated a strong significant relationship with financial development. Hence, all the independent variables and control variables selected are strong indicators of financial development.

5.2 Discussion on Findings

5.2.1 FinTech Penetration, Financial Inclusion and Financial Development

Based on Table 5.1, fintech penetration is statistically significant to financial development and both variables exhibit a positive association in the sampled countries. The findings are akin to Aduba et al.'s (2023) study of 80 EMDEs from 2011-2017 and Muganyi et al.'s (2022) study of 290 cities in China spanning 2011-2018. Nevertheless, the outcome of financial inclusion demonstrated otherwise. It is statistically significant with financial development, but it exhibits a negative association with financial development. This opposes the results of Ma et al. (2024) and Oanh et al. (2023) which demonstrated a positive association.

On the other hand, the findings can be supported by other studies. For instance, Zeqiraj et al. (2022) stated that greater financial inclusion could be detrimental to the financial systems during an economic recession especially when the event is unprecedented, and the nation has no preliminary measures to tackle the sudden shock. Moreover, the financial exclusion in this panel of countries remains high and its implementation could be too insufficient to boost financial development. In essence, most users in African countries chose to be financially excluded due to a low level of confidence in financial services and low financial literacy (Akande et al., 2023; Sanderson et al., 2018). Based on the statistics revealed by Aggarwal and Klapper (2013), only 23% of the adults in Africa own an account in formal institutions as compared to 89% in those developed countries. Another possible reason that causes the negative relationship is because of the indicator employed for financial inclusion. In this study, commercial banks per 100,000 is utilized as the proxy for financial inclusion, which is considered traditional financial inclusion. Another study stated that only digital financial inclusion can foster

financial development, traditional financial inclusion is not (Sahay et al., 2020). Hence, the impact of two variables should be discussed together to gain more valuable insights.

Aduba et al. (2023) further explained that the effects of fintech penetration are greater in nations with higher financial exclusion. They revealed that besides fostering financial development, fintech adoption has a strong impact on nations with low financial inclusion. Ahmad et al. (2023) and Berkmen et al. (2019) also held the same opinion. Moreover, our findings are the same as the outcome of Ahmad et al. (2023) where they underscored the impact of mobile phone diffusion is generally greater in less-developed countries. Hence, we assert that the impact of fintech penetration on financial development is greater in countries with relatively high financial exclusion.

5.2.2 Governance Quality and Financial Development

Secondly, the results reveal that governance quality is a significant variable that can explain financial development and they are positively associated. The results are aligned with the outcome of Becerra et al. (2012) in 97 countries from 1965-2003 and Bekana (2023) in 45 African countries spanning from 1996-2018. The latest study by Chletsos and Sintos (2024) in 123 countries from 1980 to 2017 revealed that the positive relationship is especially visible in democratic nations with effective governments and constantly promoting reformations in financial liberalization. The authors underscored the greater the political stability in a nation, the higher the financial development because the savers, depositors, and investors are more willing to participate in such stable financial systems.

On the other hand, past literature such as Batuo et al. (2018) argued that regulations might be the source of instability in African countries as they lead to rigidity in financial systems which hinders financial growth. Lu and Yao (2009) also held the view that rigidity could lead to higher political rent-seeking behavior in China, where the officials are more prone to engage in illegal activities. There is also evidence from developing nations where anti-corruption attempts negatively affect financial development because scholars found that corruption exists in every type of political structure and corruption has the tendency to increase efficiency in the financial system (Song et al., 2021).

Despite various opposing views, the findings are consistent with most of the past literature. This research is conducted in low-income and lower-middle-income countries from 2011 to 2021. Most of these countries are struggling with their political stability and institutional quality hence, the countries which demonstrate higher governance quality and practice democracy tend to have an efficient and stable financial system that fosters financial development.

5.2.3 Financial Performance and Financial Development

Based on Table 5.1, financial performance is a significant control variable, and it has a positive impact on financial development. This is similar to the findings of Murinde (2012) in lower-income countries and Ongore and Kusa (2013) in Kenya from 2001 to 2010. The authors explained that financial development can be affected by the performance of banks. In this study, the bank's efficiency ratio is used as the proxy of financial performance, and it indicates that an efficient banking sector helps to promote financial development in a country and the results are aligned with those of Čihák et al. (2013) which highlighted that institutional profitability depends on the banks' efficiency.

Moreover, some scholars utilized different indicators to represent financial performance in their studies and obtained similar results. For instance, Aduba et al. (2023) found that the stability ratios exhibited a positive relationship with financial development. Similarly, Sarkar and Sensarma (2016) employed z-score as the proxy of financial performance and revealed that financial performance is positively correlated to financial development. This is because the stability of financial institutions will enhance investors' confidence, which attracts more capital inflows and hence, improves the financial sector performance. To extend the context, the benefits of fintech adoption on financial development can be escalated if the financial stability is strengthened (Aduba et al., 2022).

5.2.4 Macroeconomic Control Variables and Financial Development

The outcome of the study demonstrated that both macroeconomic variables: (1) GDP per capita and (2) population size demonstrated a positive relationship with financial development. Similarly, Aduba et al. (2023) and Bekana (2023) yielded the same results. These two variables are commonly used as control variables to take into account specific country-level variations. Theoretically, the higher the income per capita, the higher the propensity for people to save and invest. Since Bekana (2023) defined financial development as the level of national savings, GDP per capita is positively related to financial development. As for population, a greater population size means that there is more human capital to contribute to the nation's GDP. Thus, it exhibits a positive relationship with financial development.

5.3 Implications of the Study

5.3.1 Institutional Reforms and Legitimacy

Firstly, the findings from this study reveal that financial performance and governance quality have positive impacts on financial development. The governments in these countries should prioritize their efforts to promote institutionalization and legitimacy to strengthen political stability, as suggested in the institutional theory. These approaches are supported by the research of Fulghum (1985) and Davies (1969) in Latin American countries. For instance, governments should construct a framework that fosters fair and peaceful competition in the financial markets. This can be achieved by partial government intervention. In other words, the government should only play its supervisory role to ensure that the interests and values of the economic agents are aligned with the government's (Quirk & Meiser, 2020). Not only do the economic agents benefit from the free competition in the financial markets, but they are rest assured to trade in safer and more stable financial systems thanks to the stable political environment and the rule of law. It will enhance the confidence of the economic agents and thus, encourage more potential players to participate in the financial markets to improve liquidity. Consequently, creating efficient financial markets that foster financial development. As reported in Girma and Shortland's (2008) study, stable financial institutions tend to attract savers, depositors, and investors. In short, the government should focus its initiatives on several aspects: (1) formulating proper macroeconomic policies such as tackling high inflation; (2) fostering institutional development; and (3) enacting structural reforms. These reformation efforts have proven to be successful in Asian countries such as Malaysia and Indonesia. Hence, African countries and other low-income nations can implement institutional reforms and strengthen legitimacy to foster financial inclusion and ultimately, strengthen their financial development (Pill & Pradhan, 1997).

5.3.2 Investment in Human Capital

Secondly, the results of this study reveal that financial performance is positively correlated to financial development. Since the proxy employed for financial performance is the return on equity, the policymakers such as financial institutions and the government in these countries should seek approaches to boosting the overall ROE of the financial institutions. Based on the findings of numerous researchers, they should focus on improving the skills and expertise of the employees working in the financial sectors, especially in banks. Nguyen et al. (2015) found that the education level of bank employees is significant to the bank's performance in developed nations. This is especially important when the bank hires high-level executives as they tend to contribute to the shareholder's wealth of banks if they are more knowledgeable and experienced. The government and Ministry of Education in these countries should allocate more capital to schools and institutions to increase the literacy rate and education level of human resources.

Moreover, the findings of Rahman and Akhter (2021) revealed that employee training, knowledge level, and skills can affect the performance of banks in Bangladesh. The scholars claimed that in such a developing nation, it is of utmost importance to provide regular employee training to ensure that their skills are aligned with the facilities because they are working in a highly dynamic financial environment. In essence, a skillful workforce tends to be more productive and efficient, so it eliminates the wastage of resources and time, ultimately improving the financial performance of the banks. Furthermore, it is vital to ensure that their skills are relevant to their job scope. For instance, the staff must be able to understand the sales and operations of the banks to deliver a high-quality job instead of just memorizing without understanding.

Furthermore, the staff should possess technological skills to provide high-quality fintech services to the customers. Simultaneously, they play important roles in educating, and addressing customers' inquiries while also raising fintech awareness among customers. Therefore, the financial sector in such countries should invest in training and development programs to nurture talents and improve the skills of human resources to enhance the performance of financial institutions. This can be linked back to the institutional theory where the performance of financial institutions will positively affect financial development.

In short, investment in human capital requires combined efforts from the government and financial institutions. Although policies play a crucial role in regulating the financial systems, human resources skills and education levels should not be neglected.

5.3.3 Promoting FinTech Adoption

Lastly, the outcomes of this study suggested that fintech penetration (ATM penetration and mobile money account users) is positively related to financial development. Some authors suggested that regulators, fintech companies, and financial institutions should collaborate to formulate an effective framework to integrate financial activities among the financially excluded people in developing nations. The strategic collaboration of three parties should create synergies and it is considered fundamental for the future of fintech because 95 percent of fintech startups fail without collaboration (Guo et al., 2023; Mention, 2019). Firstly, the regulators should create a startup-friendly environment to encourage more innovations and fintech entrepreneurs to foster digital financial inclusion. Secondly, the fintech companies should consider penetrating the

market of the sampled countries as they have low financial inclusion. It is an opportunity to become the pioneer of fintech in the markets.

Guo et al. (2023) highlighted that fintech facilitates the elimination of information asymmetry hence, it promotes an efficient financial resources allocation which fosters financial inclusion. Besides that, technological advancements are effective in eliminating fraud and tax evasion in financial systems. Hence, the government and financial institutions should attempt to increase Internet accessibility at an affordable price and raise public awareness of the advantages of using online banking. Jamil et al. (2023) and Oanh et al. (2023) underscored the importance of improving the public's digital financial literacy so that they have better decision-making ability while using fintech services such as ATMs and mobile money accounts. Furthermore, it is important to increase the penetration of ATMs to ease users' withdrawals and simultaneously, promote branchless banks (Rahman et al., 2023). Not only does it increase financial inclusiveness and institutional stability in the countries, but it also helps to reduce illegal economic transactions (Ong et al., 2023), linking back to the market imperfections theory. This approach has successfully propelled the financial development of ASEAN countries. Therefore, we propose that policymakers should focus their efforts on encouraging adults to utilize fintech services in these nations.

5.4 Limitations of Study

Firstly, although most of the authors employed the ratio of domestic credit to the private sector (% GDP) to measure financial development, many recent researchers began to argue that this proxy alone does not capture the multidimensional concept. Sahay et al. (2015) stated that there are supposed to be four dimensions in measuring a nation's financial development which include access, stability, depth, and efficiency. Similarly, Chletsos and Sintos (2024) also stated in their latest study that measuring financial development with traditional indicators obtained from the World Bank is no longer representative of the entire financial system. The conventional indicators only measure the performance of financial institutions but neglect the performance of financial markets. In this study, only traditional proxy is utilized to represent financial development since most of the prominent literature in this field used this proxy.

Secondly, the emergence of fintech only happened in the past decade so the data of its proxies obtained from the World Bank are very limited, especially in these groups of lower-income nations. In essence, digital financial inclusion was not integrated into the empirical model because of the same reason. Unfortunately, the fintech indicators are only available for 2011, 2014, 2017, and 2021 and there are no other better proxies, as per current knowledge. Since this study is conducted for a large sample size, these available data are adequate to reflect fintech penetration and provide ideal results that complement the hypotheses proposed (Aduba et al., 2023).

Thirdly, the goal of this study is to investigate the impact of fintech penetration and governance quality on financial development to address the gap as no authors have attempted to include both variables in their empirical models. Nevertheless, we only focus on the direct relationship between these variables without considering other possible mediating effects.

5.5 Recommendations for Future Research

In this section, constructive recommendations are provided for future scholars who wish to conduct new studies in this field. Firstly, financial development can be measured according to the four dimensions suggested by the IMF (Svirydzenka, 2016). The author highlighted that the new measurement indicators will take into account the access, depth, and efficiency of financial markets and financial institutions. Thus, future scholars can refer to the new way of measurement to understand the concept of financial development more comprehensively.

Secondly, future scholars should seek new ways of measuring fintech. Since the readily available data are limited, they can consider adopting primary data collection whereby they can collect actual data from interviewing the financial institutions or the people to get their perspectives on the fintech development in a certain area.

Lastly, future scholars can investigate more variables that might be relevant to this field so that they can propose a new conceptual framework. They can examine the interaction between the possible mediating variables, independent variables, and dependent variables. This will provide deeper insights to the researchers so that they can determine better policies and implications to drive financial development.

5.6 Conclusion

The main purpose of this research is to examine the impact of fintech penetration and governance quality on financial development in 64 low-income and lower-middle-income countries. This study employs secondary research and the GMM estimators to obtain the findings by using StataMP software. These findings are discussed comprehensively, and it has undoubtedly enriched the financial development literature. The results revealed that fintech penetration and governance quality are all statistically significant to financial development. These results complement our hypotheses proposed in the earlier section. Lastly, the shortcomings of the study are identified followed by recommendations on how future researchers can improve.

REFERENCES

Abbasi, K., Alam, A., Du, M. A., & Huynh, T. L. D. (2021). Fintech, SME efficiency and national culture: Evidence from OECD countries. *Technological Forecasting and Social Change, 163*(1), 1-9. https://doi.org/10.1016/j.techfore.2020.120454

Abel, S., Mutandwa, L., & Roux, P. L. (2018). A review of determinants of financial inclusion. *International Journal of Economics and Financial Issues, 8*(3), 1-8. https://doi.org/10.32479/irmm.7127

Acemoglu, D., & Johnson, S. (2003). Unbundling institutions. *Journal of Political Economy, 113*(5), 949-995.

Aduba, J. J., Asgari, B., & Izawa, H. (2022). Causality between financial performance, fintech, financial inclusion, and financial development in emerging and developing economies: A cross country analysis. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4113175

Aduba, J. J., Asgari, B., & Izawa, H. (2023). Does fintech penetration drive financial development? Evidence from panel analysis of emerging and developing economies. *Borsa Istanbul Review, 23*(5), 1078-1097. https://doi.org/10.1016/j.bir.2023.06.001

Aggarwal, S., & Klapper, L. (2013). Designing government policies to expand financial inclusion: Evidence from around the world. *The Journal of Finance, 56*(3), 1029-1051.

Ahlin, C., & Pang, J. (2008). Are financial development and corruption control substitutes in promoting growth? *Journal of Development Economics, 86*(2), 414-433. https://doi.org/10.1016/j.jdeveco.2007.07.002

Ahmad, A. H., Green, C. J., Jiang, F., & Murinde, V. (2023). Mobile money, ICT, financial inclusion and growth: How different is Africa? *Economic Modelling, 121*(1), 1-18. https://doi.org/10.1016/j.econmod.2023.106220

Akande, J. O., Hosu, Y. S., Kabiti, H., Ndhleve, S., & Garidzirai, R. (2023). Financial literacy and inclusion for rural agrarian change and sustainable livelihood in the Eastern Cape, South Africa. *Heliyon, 9*(6), 1-12. https://doi.org/10.1016/j.heliyon.2023.e16330

Akimov, A., Wijeweera, A., & Dollery, B. (2009). Financial development and economic growth: Evidence from transition economies. *Applied Financial Economics, 19*(12), 999–1008. https://doi.org/10.1080/09603100701857880

Aladangady, A., Aron-Dine, S., Dunn, W., Feiveson, L., Lengermann, P., & Sahm, C. (2019). From transaction data to economic statistics: Constructing real-time, high-frequency, geographic measures of consumer spending. *Finance and Economics Discussion Series, 2019*(57), 115-145. https://doi.org/10.17016/feds.2019.057

Albaity, M., Mallek, R. S., & Noman, A. H. M. (2019). Competition and bank stability in the MENA region: The moderating effect of Islamic versus conventional banks. *Emerging Markets Review, 38*(1), 310-325. https://doi.org/10.1016/j.ememar.2019.01.003

Almazari, A. A. (2012). Financial performance analysis of the Jordanian Arab bank by using the DuPont system of financial analysis. *International Journal of Economics and Finance, 4*(4), 86-94. https://doi.org/10.5539/ijef.v4n4p86

Alrabei, A. M., Al-Othman, L. N., Al-Dalabih, F. A. N., Taber, T. A., Ali, B. J., & Amareen, A. M. (2022). The impact of mobile payment on the financial inclusion rates. *Information Sciences Letters, 11*(4), 1033-1044. https://doi.org/10.18576/isl/110404

Álvarez-Gamboa, J., Cabrera-Barona, P., & Jácome-Estrella, H. (2023). Territorial inequalities in financial inclusion: A comparative study between private banks and credit unions. *Socio-Economic Planning Sciences, 87*(1), 1-10. https://doi.org/10.1016/j.seps.2023.101561

Aman, Z., Mallick, S., & Nemlioglu, I. (2022). Currency regimes and external competitiveness: The role of institutions, trade agreements and monetary frameworks. *Journal of Institutional Economics, 18*(3), 399–428. https://doi.org/10.1017/S1744137421000503

Anagnostopoulos, I. (2018). Fintech and regtech: Impact on regulators and banks. *Journal of Economics and Business, 100*(1), 7-25. https://doi.org/10.1016/j.jeconbus.2018.07.003

Andrews, D. W., & Lu, B. (2001). Consistent model and moment selection procedures for GMM estimation with application to dynamic panel data models. *Journal of Econometrics, 101*(1), 123-164. https://doi.org/10.1016/S0304-4076(00)00077-4

Appiah-Otoo, I., Chen, X., Song, N., & Dumor, K. (2022). Financial development, institutional improvement, poverty reduction: The multiple challenges in West Africa. *Journal of Policy Modeling, 44*(6), 1296-1312. https://doi.org/10.1016/j.jpolmod.2022.11.002

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics, 68*(1), 29-51. https://doi.org/10.1016/0304-4076(94)01642-D

Arora, R. (2017). Government intervention and financial sector development. *Development Finance: Opportunities and Challenges, 1*(1), 53–78. https://doi.org/10.1057/978-1-137-58032-0_3

Asongu, S. A. (2017). Does globalization promote good governance in Africa? An empirical study across 51 countries. *World Affairs, 180*(2), 105-141.

Asongu, S. A., & Le Roux, S. (2017). Enhancing ICT for inclusive human development in Sub-Saharan Africa. *Technological Forecasting and Social Change, 118*(1), 44-54. https://doi.org/10.1016/j.techfore.2017.01.026

Asongu, S. A., & Nwachukwu, J. C. (2017). The impact of terrorism on governance in African countries. *World Development, 99*(1), 253-270. https://doi.org/10.1016/j.worlddev.2017.05.023

Asteriou, D., & Siriopoulos, C. (2000). The role of political instability in stock market development and economic growth: The case of Greece. *Economic Notes, 29*(3), 355-374. https://doi.org/10.1111/1468-0300.00037

Atta-Ankomah, R. (2022). Credit for households in Ghana: Has mobile money (momo) improved inclusive access? *Scientific African, 16*(1), 1-12. https://doi.org/10.1016/j.sciaf.2022.e01230

Azeem, A., Aziz, B., & Jadoon, A. K. (2015). Financial development: a contributing agent of economic growth-study of selected Asian countries. *Pakistan Business Review, 17*(2), 397-415.

Bahadir, B., & Valev, N. (2015). Financial development convergence. *Journal of Banking & Finance, 56*(1), 61-71. https://doi.org/10.1016/j.jbankfin.2015.03.001

Baker, S. R. (2018). Debt and the response to household income shocks: Validation and application of linked financial account data. *Journal of Political Economy, 126*(4), 1504–1557. https://doi.org/10.1086/698106

Baltgailis, J., & Simakhova, A. (2022). The technological innovations of fintech companies to ensure the stability of the financial system in pandemic times. *Marketing and Management of Innovations, 2*(1), 55–65. https://doi.org/10.21272/mmi.2022.2-05

Banerjee, A. V., & Newman, A. F. (1993). Occupational choice and the process of development. *Journal of Political Economy, 101*(2), 274-298.

Basten, C., & Ongena, S. (2020). The geography of mortgage lending in times of fintech. *CEPR Discussion Paper No. DP14918*.

Bátiz-Lazo, B. (2018). *Cash and dash: How ATMs and computers changed banking*. Oxford University Press.

Batuo, M., Mlambo, K., & Asongu, S. (2018). Linkages between financial development, financial instability, financial liberalisation and economic growth in Africa. *Research in International Business and Finance, 45*(1), 168-179. https://doi.org/10.1016/j.ribaf.2017.07.148

Baum, C. F., Schaffer, M. E., & Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *The Stata Journal: Promoting Communications on Statistics and Stata, 3*(1), 1–31. https://doi.org/10.1177/1536867x0300300101

Becerra, O., Cavallo, E., & Scartascini, C. (2012). The politics of financial development: The role of interest groups and government capabilities. *Journal of Banking & Finance, 36*(3), 626-643. https://doi.org/10.1016/j.jbankfin.2011.10.017

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2003). Law, endowments, and finance. *Journal of Financial Economics, 70*(2), 137-181. https://doi.org/10.1016/S0304-405X(03)00144-2

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of Economic Growth, 12*(1), 27–49. https://doi.org/10.1007/s10887-007-9010-6

Beck, T., Demirgüç-Kunt, A., & Martinez Peria, M. S. (2008). Banking services for everyone? Barriers to bank access and use around the world. *The World Bank Economic Review, 22*(3), 397–430. https://doi.org/10.1093/wber/lhn020

Beck, T., & Levine, R. (2005). Legal institutions and financial development. *Handbook of New Institutional Economics*, 251-278. Boston, MA: Springer US.

Bekana, D. M. (2023). Governance quality and financial development in Africa. *World Development Sustainability, 2*(1), 1-14. https://doi.org/10.1016/j.wds.2023.100044

Berger, A. N., & Humphrey, D. B. (1997). Efficiency of financial institutions: International survey and directions for future research. *European Journal of Operational Research, 98*(2), 175-212. https://doi.org/10.1016/S0377-2217(96)00342-6

Berkmen, P., Beaton, K., Gershenson, D., del Granado, J. A., Ishi, K., Kim, M., Kopp, E., & Rousset, M. (2019). *Fintech in Latin America and the Caribbean: Stocktaking*. International Monetary Fund.

Bikker, J. A., & Vervliet, T. M. (2017). Bank profitability and risk-taking under low interest rates. *International Journal of Finance & Economics, 23*(1), 3–18. https://doi.org/10.1002/ijfe.1595

Biørn, E. (2014). Panel data dynamics with mis-measured variables: Modeling and GMM estimation. *Empirical Economics, 48*(2), 517–535. https://doi.org/10.1007/s00181-014-0802-1

Bist, J. P. (2018). Financial development and economic growth: Evidence from a panel of 16 African and non-African low-income countries. *Cogent Economics & Finance, 6*(1), 1-17. http://doi.org/10.1080/23322039.2018.1449780

Blackburn, K., & Forgues-Puccio, G. F. (2010). Financial liberalization, bureaucratic corruption and economic development. *Journal of International Money and Finance, 29*(7), 1321-1339. https://doi.org/10.1016/j.jimonfin.2010.05.002

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics, 87*(1), 115-143. https://doi.org/10.1016/S0304-4076(98)00009-8

Boyd, J. H., & de Nicoló, G. (2005). The theory of bank risk taking and competition revisited. *The Journal of Finance, 60*(3), 1329-1343.

Breza, E., Kanz, M., & Klapper, L. F. (2020). Learning to navigate a new financial technology: Evidence from payroll accounts. *NBER Working Paper Series,* 1-70. https://doi.org/10.3386/w28249

Bu, Y., Yu, X., & Li, H. (2022). The nonlinear impact of fintech on the real economic growth: Evidence from China. *Economics of Innovation and New Technology*, *32*(8), 1138–1155. https://doi.org/10.1080/10438599.2022.2095512

Carvallo, O., & Pagliacci, C. (2016). Macroeconomic shocks, bank stability and the housing market in Venezuela. *Emerging Markets Review, 26*(1), 174–196. https://doi.org/10.1016/j.ememar.2015.12.002

Casson, M. C., Giusta, M. D., & Kambhampati, U. S. (2010). Formal and informal institutions and development. *World Development, 38*(2), 137-141. https://doi.org/10.1016/j.worlddev.2009.10.008

Cavoli, T., & Gopalan, S. (2023). Does financial inclusion promote consumption smoothing? Evidence from emerging and developing economies. *International Review of Economics & Finance, 88*(1), 1529–1546. https://doi.org/10.1016/j.iref.2023.07.037

Chen, X., He, G., & Li, Q. (2024). Can fintech development improve the financial inclusion of village and township banks? Evidence from China. *Pacific-Basin Finance Journal, 85*(1), 1-19. https://doi.org/10.1016/j.pacfin.2024.102324

Chen, Y., Yang, S., & Li, Q. (2022). How does the development of digital financial inclusion affect the total factor productivity of listed companies? Evidence from China. *Finance Research Letters, 47*(1), 1-6. https://doi.org/10.1016/j.frl.2022.102956

Chigeto, A. D., Jayamohan, M. K., & Ayeru, E. (2024). Does financial development and institutional quality matter in south-south trade? Evidence from Sub-Saharan Africa. *Research in Globalization, 8*(1), 1-15. https://doi.org/10.1016/j.resglo.2024.100209

Chletsos, M., & Sintos, A. (2024). Political stability and financial development: An empirical investigation. *The Quarterly Review of Economics and Finance, 94*(1), 252-266. https://doi.org/10.1016/j.qref.2024.02.003

Čihák, M., Demirgüç-Kunt, A., Feyen, E., & Levine, R. (2012). Benchmarking financial systems around the world. *Policy Research Working Paper, 6175*.

Čihák, M., Demirgüč-Kunt, A., Feyen, E., & Levine, R. (2013). Financial development in 205 economies, 1960 to 2010. *NBER Working Paper Series*. https://doi.org/10.3386/w18946

Cole, R. A., Cumming, D. J., & Taylor, J. (2019). Does fintech compete with or complement bank finance? *SSRN Electronic Journal*.

da Silva, L. A. P. (2018, June). Fintech in EMEs: blessing or curse. In *Bank for International Settlement, Panel remarks at CV Meeting of Central Bank Governors of CEMLA-Asuncion, Paraguay.*

Daud, S. N. M., & Ahmad, A. H. (2023). Financial inclusion, economic growth and the role of digital technology. *Finance Research Letters, 53*(1), 1-7. https://doi.org/10.1016/j.frl.2022.103602

Davies, J. C. (1969). Political stability and instability: some manifestations and causes. *Journal of Conflict Resolution, 13*(1), 1-17. https://doi.org/10.1177/002200276901300101

Demir, A., Pesqué-Cela, V., Altunbas, Y., & Murinde, V. (2022). Fintech, financial inclusion and income inequality: A quantile regression approach. *The European Journal of Finance, 28*(1), 86-107. https://doi.org/10.1080/1351847X.2020.1772335

Demirguc-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2018). *The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution.* World Bank Publications.

Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of Covid-19.* World Bank Publications.

Dharmadasa, P. D. C. S. (2021). Fintech services and the future of financial intermediation: A review. *Sri Lanka Journal of Economic Research, 8*(2), 21-38. http://doi.org/10.4038/sljer.v8i2.135

Ding, C., Kavuri, A. S., & Milne, A. (2021). PS14 lessons from the rise and fall of Chinese peer-to-peer lending. *Journal of Banking Regulation, 22*(2), 133-143. https://doi.org/10.1057/s41261-020-00132-2

Dosso, D. (2023). Institutional quality and financial development in resource-rich countries: A nonlinear panel data approach. *International Economics, 174*(1), 113-137. https://doi.org/10.1016/j.inteco.2023.03.005

Ehigiamusoe, K. U., Guptan, V., & Narayanan, S. (2021). Rethinking the impact of GDP on financial development: Evidence from heterogeneous panels. *African Development Review, 33*(1), 1-13. https://doi.org/10.1111/1467-8268.12469

Ernst & Young. (2017). *EY fintech adoption index: Fintech services poised for mainstream adoption in the US with 1 in 3 digitally active consumers using fintech.* Press release, June 28. Retrieved March 15, 2024, from https://www.ey.com/us/en/newsroom/news-releases/news-ey-fintech-adoption- index

Frunză, R. (2011). Formal institutions and regional development. Considerations regarding Romania. *Theoretical & Applied Economics, 18*(4), 141-158.

Fulghum, S. (1985). Factors affecting the political stability of certain Latin American countries. *Master's Theses, Paper 498*. University of Richmond.

Galbraith, J. W., & Tkacz, G. (2007). *Electronic transactions as high-frequency indicators of economic activity* (No.2007-58). Bank of Canada.

Galor, O., & Zeira, J. (1993). Income distribution and macroeconomics. *The Review of Economic Studies, 60*(1), 35-52. https://doi.org/10.2307/2297811

García, M. J. R., & José, M. (2016). Can financial inclusion and financial stability go hand in hand. *Economic Issues, 21*(2), 81-103.

Garg, S., & Agarwal, P. (2014). Financial inclusion in India – A review of initiatives and achievements. *IOSR Journal of Business and Management, 16*(6), 52-61.

Gazdar, K., & Cherif, M. (2014). The quality of institutions and financial development in MENA countries: An empirical investigation. *Risk Governance and Control: Financial Markets and Institutions, 4*(4), 65-80.

George, G. E., Miroga, J. B., Ngaruiya, N. W., Mindila, R., Nyakwara, S., Mobisa, M. J., Joseph, O., Mandere, E. N., & Moronge. M. O. (2013). An analysis of loan portfolio management on organization profitability: Case of commercial banks in Kenya. *Research Journal of Finance and Accounting, 4*(8), 24–35.

Girma, S. & Shortland, A. (2008). The political economy of financial development. *Oxford Economic Papers, 60*(4), 567–596. https://doi.org/10.1093/oep/gpm040

Goldsmith, R. W. (1959). Financial structure and development as a subject for international comparative study. In the *Comparative Study of Economic Growth and Structure* (pp. 114-123). NBER.

Gong, C. M., Gong, P., & Jiang, M. (2023). Corporate financialization and investment efficiency: Evidence from China. *Pacific-Basin Finance Journal, 79*(1), 1-12. https://doi.org/10.1016/j.pacfin.2023.102045

Goode, A. (2018). Biometrics for banking: Best practices and barriers to adoption. *Biometric Technology Today, 2018*(10), 5-7. https://doi.org/10.1016/S0969-4765(18)30156-5

Grittersová, J. (2022). The politics of privatization, quality of governance, and financial development in Eastern Europe. *Problems of Post-Communism, 69*(6), 445-460. https://doi.org/10.1080/10758216.2020.1869908

Guo, J., Fang, H., Liu, X., Wang, C., & Wang, Y. (2023). Fintech and financing constraints of enterprises: Evidence from China. *Journal of International Financial Markets, Institutions and Money, 82*(1), 1-16. https://doi.org/10.1016/j.intfin.2022.101713

Guo, P., & Shen, Y. (2016). The impact of Internet finance on commercial banks' risk taking: Evidence from China. *China Finance and Economic Review, 4*(16), 1-19. https://doi.org/10.1186/s40589-016-0039-6

Guo, P., & Zhang, C. (2023). The impact of bank fintech on liquidity creation: Evidence from China. *Research in International Business and Finance, 64*(1), 1-25. https://doi.org/10.1016/j.ribaf.2022.101858

Haber, S. H., North, D. C., & Weingast, B. R. (2008). *Political institutions and financial development*. Stanford University Press.

Haddad, C., & Hornuf, L. (2019). The emergence of the global fintech market: Economic and technological determinants. *Small Business Economics, 53*(1), 81-105. https://doi.org/10.1007/s11187-018-9991-x

Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica: Journal of the Econometric Society, 50*(4), 1029-1054. https://doi.org/10.2307/1912775

Hasan, I., Wachtel, P., & Zhou, M. (2009). Institutional development, financial deepening and economic growth: Evidence from China. *Journal of Banking & Finance, 33*(1), 157-170. https://doi.org/10.1016/j.jbankfin.2007.11.016

Hou, X., Gao, Z., & Wang, Q. (2016). Internet finance development and banking market discipline: Evidence from China. *Journal of Financial Stability, 22*(1), 88-100. https://doi.org/10.1016/j.jfs.2016.01.001

Huang, Y. (2010). Political institutions and financial development: An empirical study. *World Development, 38*(12), 1667-1677. https://doi.org/10.1016/j.worlddev.2010.04.001

Ikhsan, A., & Satrianto, A. (2023). The effect of financial development on economic growth in high-income countries. *Asian Economic and Financial Review, 13*(3), 202-215. https://doi.org/10.55493/5002.v13i3.4743

Jagtiani, J., & Lemieux, C. (2018). Do fintech lenders penetrate areas that are underserved by traditional banks? *Journal of Economics and Business, 100*(1), 43-54. https://doi.org/10.1016/j.jeconbus.2018.03.001

Jamil, A. R. M., Law, S. H., Khair-Afham, M. S. M., & Trinugroho, I. (2023). Financial inclusion and economic uncertainty in developing countries: The role of digitalisation. *Economic Analysis and Policy, 79*(1), 786–806. https://doi.org/10.1016/j.eap.2023.06.039

Kanga, D., Oughton, C., Harris, L., & Murinde, V. (2022). The diffusion of fintech, financial inclusion and income per capita. *The European Journal of Finance, 28*(1), 108-136. https://doi.org/10.1080/1351847X.2021.1945646

Kapidani, M., & Luci, E. (2019). The effects on innovation from financial sector development: Evidence from developing countries. *Journal of Competitiveness, 11*(2), 84-94. https://doi.org/10.7441/joc.2019.02.06

Katara, S. (2023, March 16). Council post: The rise of FinTech and open finance. *Forbes*. Retrieved April 1, 2024, from https://www.forbes.com/sites/forbestechcouncil/2023/03/16/the-rise-of-fintech-and-open-finance/?sh=5a16a0dc39cc

Khalid, U., & Shafiullah, M. (2021). Financial development and governance: A panel data analysis incorporating cross-sectional dependence. *Economic Systems, 45*(2), 1-16. https://doi.org/10.1016/j.ecosys.2021.100855

Khan, H., Khan, S., & Fan, Z. (2022). Institutional quality and financial development: Evidence from developing and emerging economies. *Global Business Review, 23*(4), 971-983. https://doi.org/10.1177/0972150919892366

Khan, M. A., Kong, D., Xiang, J., & Zhang, J. (2019). Impact of institutional quality on financial development: Cross-country evidence based on emerging and growth-leading economies. *Emerging Markets Finance and Trade, 56*(15), 3829-3845. https://doi.org/10.1080/1540496X.2019.1588725

Kim, M., Zoo, H., Lee, H., & Kang, J. (2018). Mobile financial services, financial inclusion, and development: A systematic review of academic literature. *The Electronic Journal of Information Systems in Developing Countries, 84*(5), 1-17. https://doi.org/10.1002/isd2.12044

Koomson, I., Koomson, P., & Abdul-Mumuni, A. (2023). Trust in banks, financial inclusion and the mediating role of borrower discouragement. *International Review of Economics & Finance, 88*(1), 1418–1431. https://doi.org/10.1016/j.iref.2023.07.090

Kopp, E., Kaffenberger, L., & Wilson, C. (2017). *Cyber risk, market failures, and financial stability*. International Monetary Fund.

Krifa-Schneider, H., Matei, I., & Sattar, A. (2022). FDI, corruption and financial development around the world: A panel non-linear approach. *Economic Modelling, 110*(1), 1-18. https://doi.org/10.1016/j.econmod.2022.105809

Kshetri, N., & Loukoianova, E. (2019). Blockchain adoption in supply chain networks in Asia. *IT Professional, 21*(1), 11-15. https://doi.org/10.1109/MITP.2018.2881307

Law, S. H., & Azman-Saini, W. N. W. (2012). Institutional quality, governance, and financial development. *Economics of Governance, 13*(1), 217-236. https://doi.org/10.1007/s10101-012-0112-z

Le, T. D. Q., & Ngo, T. (2020). The determinants of bank profitability: A cross-country analysis. *Central Bank Review, 20*(2), 65-73. https://doi.org/10.1016/j.cbrev.2020.04.001

Leong, C., Tan, B., Xiao, X., Tan, F. T. C., & Sun, Y. (2017). Nurturing a fintech ecosystem: The case of a youth microloan startup in China. *International Journal of Information Management, 37*(2), 92-97. https://doi.org/10.1016/j.ijinfomgt.2016.11.006

Levine, R. (1999). Law, finance, and economic growth. *Journal of Financial Intermediation, 8*(1-2), 8–35. https://doi.org/10.1006/jfin.1998.0255

Li, J., Maung, M., & Wilson, C. (2018). Governance and financial development: A cross-country analysis. *Journal of International Financial Markets, Institutions and Money, 52*(1), 227-239. https://doi.org/10.1016/j.intfin.2017.09.020

Lu, S. F., & Yao, Y. (2009). The effectiveness of law, financial development, and economic growth in an economy of financial repression: Evidence from China. *World Development, 37*(4), 763-777. https://doi.org/10.1016/j.worlddev.2008.07.018

Lu, X., & White, H. (2014). Robustness checks and robustness tests in applied economics. *Journal of Econometrics, 178*(1), 194–206. https://doi.org/10.1016/j.jeconom.2013.08.016

Ma, Y., Ding, Y., Bu, Z., & Li, S. (2024). Political freedom and financial inclusion: Unraveling social trust and political rent-seeking. *Journal of Economic*

Behavior & Organization, 220(1), 46-65. https://doi.org/10.1016/j.jebo.2024.01.024

Makina, D. (Eds.). (2019). The potential of fintech in enabling financial inclusion. *Extending financial inclusion in Africa* (pp. 299-318). Academic Press. https://doi.org/10.1016/B978-0-12-814164-9.00014-1

Marchionne, F., Pisicoli, B., & Fratianni, M. (2022). Regulation, financial crises, and liberalization traps. *Journal of Financial Stability, 63*(1), 1-19. https://doi.org/10.1016/j.jfs.2022.101060

Mention, A. L. (2019). The future of Fintech. *Research-Technology Management, 62*(4), 59–63. https://doi.org/10.1080/08956308.2019.1613123

Mester, L. J. (2003). Applying efficiency measurement techniques to central banks. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.572442

Morgan, P. J. (2022). Fintech and financial inclusion in Southeast Asia and India. *Asian Economic Policy Review, 17*(2), 183–208. https://doi.org/10.1111/aepr.12379

Muganyi, T., Yan, L., Yin, Y. Sun, H., Gong, X., & Taghizadeh-Hesary, F. (2022). Fintech, regtech, and financial development: Evidence from China. *Financial Innovation*, *8*(29), 1-20. https://doi.org/10.1186/s40854-021-00313-6

Murinde, V. (2012). Financial development and economic growth: Global and African evidence. *Journal of African Economies, 21*(1), i10–i56. https://doi.org/10.1093/jae/ejr042

Nehru, V. K. (2015). Developing Myanmar's finance sector to support rapid, inclusive, and sustainable economic growth. *Asian Development Bank Economics Working Paper Series, No. 430*.

Nguyen, D. D. L., Hagendorff, J., & Eshraghi, A. (2015). Which executive characteristics create value in banking? Evidence from appointment announcements. *Corporate Governance: An International Review, 23*(2), 112-128. https://doi.org/10.1111/corg.12084

Nguyen, Q. K., & Dang, V. C. (2022). The effect of FinTech development on financial stability in an emerging market: The role of market discipline. *Research in Globalization, 5*(1), 1-15. https://doi.org/10.1016/j.resglo.2022.100105

Nicoletti, B. (2017). Financial services and fintech. *The Future of Fintech: Integrating Finance and Technology in Financial Services*, 3-29. Springer, Berlin.

North, D. C. (1981). *Structure and change in economic history*. New York.

Oanh, T. T. K., Van, L. T. T., & Dinh, L. Q. (2023). Relationship between financial inclusion, monetary policy and financial stability: An analysis in high financial development and low financial development countries. *Heliyon, 9*(6), 1-16. https://doi.org/10.1016/j.heliyon.2023.e16647

Odhiambo, N. M., & Musakwa, M. T. (2024). Remittance inflows and financial development in Sub-Saharan African countries: Does governance matter? *Heliyon, 10*(5), 1-8. https://doi.org/10.1016/j.heliyon.2024.e26953

Ong, H. B., Wasiuzzaman, S., Chong, L. L., & Choon, S. W. (2023). Digitalisation and financial inclusion of lower middle-income ASEAN. *Heliyon, 9*(2). https://doi.org/10.1016/j.heliyon.2023.e13347

Ongore, V. O., & Kusa, G. B. (2013). Determinants of financial performance of commercial banks in Kenya. *International Journal of Economics and Financial Issues, 3*(1), 237–252.

Otchere, I., Senbet, L., & Simbanegavi, W. (2017). Financial sector development in Africa – An overview. *Review of Development Finance, 7*(1), 1–5. https://doi.org/10.1016/j.rdf.2017.04.002

Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review, 18*(4), 329–340. https://doi.org/10.1016/j.bir.2017.12.003

Ozili, P. K., & Ndah, H. (2021). Impact of financial development on bank profitability. *Journal of Economic and Administrative Sciences, 37*(4), 1-25. https://doi.org/10.1108/jeas-07-2021-0140

Ozili, P. K., & Uadiale, O. (2017). Ownership concentration and bank profitability. *Future Business Journal, 3*(2), 159–171. https://doi.org/10.1016/j.fbj.2017.07.001

Paleologou, S. M. (2022). Happiness, democracy and socio-economic conditions: Evidence from a difference GMM estimator. *Journal of Behavioral and Experimental Economics, 101*(1), 1-16. https://doi.org/10.1016/j.socec.2022.101945

Patel, A. K., Singh, K., & Singh, M. (2021). Publication trends in financial inclusion: A scientometric assessment and visualization. *Library Philosophy and Practice (e-journal), 5115*(1), 1-20.

Pill, H., & Pradhan, M. (1997). Financial liberalization in Africa and Asia. *Finance and Development, 34*(1), 7-10.

Porta, R. L., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. *Journal of Political Economy, 106*(6), 1113-1155.

Pradhan, R. P., Bennett, S. E., Nair, M. S., & Arvin, M. B. (2023). Does foreign aid procurement in resource-rich countries depend on these countries' financial development and institutional quality? Evidence from PVECM and quantile-on-quantile regression. *Socio-Economic Planning Sciences, 88*(1), 1-19. https://doi.org/10.1016/j.seps.2023.101649

Purnomo, H., & Khalda, S. (2019). Influence of financial technology on national financial institutions. *IOP Conference Series: Materials Science and Engineering, 662*(2), 1-7. https://doi.org/10.1088/1757-899x/662/2/022037

Quirk, P. W., & Meiser, J. W. (2020, January 28). *Commentary: Creating a political strategy for stabilizing fragile states*. Brookings Institution. Retrieved April 8, 2024, from https://www.brookings.edu/articles/creating-a-political-strategy-for-stabilizing-fragile-states/

Rahman, M. M., & Akhter, B. (2021). The impact of investment in human capital on bank performance: Evidence from Bangladesh. *Future Business Journal, 7*(1), 1-13. https://doi.org/10.1186/s43093-021-00105-5

Rahman, S. U., Faisal, F., Ali, A., Sulimany, H. G. H., & Bazhair, A. H. (2023). Do financial technology and financial development lessen shadow economy? Evidence from BRICST economies using heterogenous bootstrap panel causality. *The Quarterly Review of Economics and Finance, 90*(1), 201-210. https://doi.org/10.1016/j.qref.2023.06.005

Rajan, R. G., & Zingales, L. (2003). The great reversals: The politics of financial development in the twentieth century. *Journal of Financial Economics, 69*(1), 5-50. https://doi.org/10.1016/S0304-405X(03)00125-9

Rajapakse, R. P. C. R., & Mayakaduwa, N. (2019). Credit rating industry in Sri Lanka. *Iconic Research and Engineering, 2*(8), 42-59.

Raza, S. H., Shahzadi, H., & Akram, M. (2014). Exploring the determinants of financial development (using panel data on developed and developing countries). *Journal of Finance and Economics, 2*(5), 166-172. https://doi.org/10.12691/jfe-2-5-6

Ricky-Okine, C. K., Amankwaa, T., & Anane, E. (2020). Banking sector competition and financial development in Sub-Saharan Africa. *International Journal of Technology and Management Research, 5*(3), 58–85. https://doi.org/10.47127/ijtmr.v5i3.104

Roe, M. J., & Siegel, J. I. (2011). Political instability: Effects on financial development, roots in the severity of economic inequality. *Journal of Comparative Economics, 39*(3), 279-309. https://doi.org/10.1016/j.jce.2011.02.001

Roodman, D. (2009a). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics, 71*(1), 135-158. https://doi.org/10.1111/j.1468-0084.2008.00542.x

Roodman, D. (2009b). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal: Promoting Communications on Statistics and Stata, 9*(1), 86–136. https://doi.org/10.1177/1536867x0900900106

Sahay, R., Cihak, M., N'Diaye, P. M., Barajas, A., Ayala Pena, D. B., Bi, R., Gao, Y., Kyobe, A. J., Nguyen, L., Saborowski, C., Svirydzenka, K., & Yousefi, S. R. (2015). Rethinking financial deepening: Stability and growth in emerging markets. *International Monetary Fund, 2015*(8), 1-41. https://doi.org/10.5089/9781498312615.006.A001

Sahay, R., von Allmen, U. E., Lahreche, A., Khera, P., Ogawa, S., Bazarbash, M., & Beaton, K. (2020). The promise of fintech: Financial inclusion in the post COVID-19 era. *International Monetary Fund, 2020*(9), 1-83. https://doi.org/10.5089/9781513512242.087

Said, R. M., & Tumin, M. H. (2011). Performance and financial ratios of commercial banks in Malaysia and China. *International Review of Business Research Papers, 7*(2), 157-169.

Sanderson, A., Mutandwa, L., & Le Roux, P. (2018). A review of determinants of financial inclusion. *International Journal of Economics and Financial Issues, 8*(3), 1-8.

Sapovadia, V. (2018). Financial inclusion, digital currency, and mobile technology. In *Handbook of Blockchain, Digital Finance, and Inclusion, Volume 2* (pp. 361-385). Academic Press. https://doi.org/10.1016/B978-0-12-812282-2.00014-0

Sarkar, S., & Sensarma, R. (2016). The relationship between competition and risk-taking behaviour of Indian banks. *Journal of Financial Economic Policy, 8*(1), 95–119. https://doi.org/10.1108/jfep-05-2015-0030

Sever, C., & Yücel, E. (2023). Does informality hinder financial development convergence? *Economic Systems*, (Article in press), 1-15. https://doi.org/10.1016/j.ecosys.2023.101174

Shao, J., Wu, D., & Jin, C. (2023). How do financial inclusion and education increase resource efficiency? *Resources Policy, 85*(1), 1-9. https://doi.org/10.1016/j.resourpol.2023.104005

Sharma, A., Das, N., & Singh, S. P. (2023). Causal association of entrepreneurship ecosystem and financial inclusion. *Heliyon, 9*(3), 1-14. https://doi.org/10.1016/j.heliyon.2023.e14596

Song, C. Q., Chang, C. P., & Gong, Q. (2021). Economic growth, corruption, and financial development: Global evidence. *Economic Modelling, 94*(1), 822-830. https://doi.org/10.1016/j.econmod.2020.02.022

Song, N., & Appiah-Otoo, I. (2022). The impact of fintech on economic growth: Evidence from China. *Sustainability 2022, 14*(10), 6211-6228. https://doi.org/10.3390/su14106211

Stiglitz, J. (1998). The role of the financial system in development. In *Presentation at the fourth annual bank conference on development in Latin America and the Caribbean* (Vol. 29, p. 17).

Struthmann, P., Walle, Y. M., & Herwartz, H. (2022). Corruption control, financial development, and growth volatility: Cross-country evidence. *Journal of Money, Credit and Banking, 52*(2), 1-28. https://doi.org/10.1111/jmcb.13051

Sun, H., Edziah, B. K., Kporsu, A. K., Sarkodie, S. A., & Taghizadeh-Hesary, F. (2021). Energy efficiency: The role of technological innovation and knowledge spillover. *Technological Forecasting and Social Change, 167*(1), 1-17. https://doi.org/10.1016/j.techfore.2021.120659

Sun, S., & Tu, Y. (2023). Impact of financial inclusion on the urban-rural income gap— Based on the spatial panel data model. *Finance Research Letters, 53*(1), 1-7. https://doi.org/10.1016/j.frl.2023.103659

Svirydzenka, K. (2016). Introducing a new broad-based index of financial development. *International Monetary Fund, 2016*(5), 1-43. https://doi.org/10.5089/9781513583709.001

Syed, A. A., Ahmed, F., Kamal, M. A., & Trinidad Segovia, J. E. (2021). Assessing the role of digital finance on shadow economy and financial instability: An empirical analysis of selected South Asian countries. *Mathematics, 9*(23), 1-15. https://doi.org/10.3390/math9233018

Tay, L. Y., Tai, H. T., & Tan, G. S. (2022). Digital financial inclusion: A gateway to sustainable development. *Heliyon, 8*(6), 1-10. https://doi.org/10.1016/j.heliyon.2022.e09766

Tian, Z. & Hassan, A. F. S. (2019). Internet finance and its potential risks: The case of China. *International Journal of Accounting, Finance and Business, 4*(20), 45-51.

Ting, H. I. (2017). Financial development, role of government, and bank profitability: Evidence from the 2008 financial crisis. *Journal of Economics and Finance, 41*(2), 370-391. https://doi.org/10.1007/s12197-016-9356-8

Tseng, K. (2022). Learning from the Joneses: Technology spillover, innovation externality, and stock returns. *Journal of Accounting and Economics, 73*(2-3), 1-17. https://doi.org/10.1016/j.jacceco.2022.101478

Twumasi, A. M., Adusah-Poku, F., Acheampong, A. O., & Opoku, E. E. O. (2024). Residential energy expenditures and the relevance of financial inclusion across location, wealth quintiles and household structures. *Heliyon, 10*(5). 1-16. https://doi.org/10.1016/j.heliyon.2024.e26710

Ullah, S., Akhtar, P., & Zaefarian, G. (2018). Dealing with endogeneity bias: The generalized method of moments (GMM) for panel data. *Industrial Marketing Management, 71*(1), 69-78. https://doi.org/10.1016/j.indmarman.2017.11.010

United Nations. (2024). *Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*. Retrieved March 17, 2024, from https://sdgs.un.org/goals/goal8

Uzar, U., Eyuboglu, K., Akdag, S., & Alola, A. A. (2023). Causal inference of financial development and institutional quality across the globe. *Physica A: Statistical Mechanics and Its Applications, 626*(1), 1-13. https://doi.org/10.1016/j.physa.2023.129035

Vučinić, M. (2020). Fintech and financial stability potential influence of fintech on financial stability, risks and benefits. *Journal of Central Banking Theory and Practice, 9*(2), 43–66. https://doi.org/10.2478/jcbtp-2020-0013

Wei, S. (2015). Internet lending in China: Status quo, potential risks and regulatory options. *Computer Law & Security Review, 31*(6), 793-809. https://doi.org/10.1016/j.clsr.2015.08.005

Widyaningsih, D., Siswanto, E., & Zusrony, E. (2021). The role of financial literature through digital financial innovation on financial inclusion (case study of Msmes in Salatiga City). *International Journal of Economics, Business and Accounting Research (IJEBAR), 5*(4), 1301-1312.

Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics, 126*(1), 25-51. https://doi.org/10.1016/j.jeconom.2004.02.005

World Bank. (2018). *Global financial inclusion (global findex) database*. Retrieved March 16, 2024, from https://www.worldbank.org/en/publication/gfdr/ data/global- financial- development- database

World Bank. (2023). *World Bank country and lending groups*. Retrieved March 19, 2024, from https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

World Bank. (2024). *Financial development*. Retrieved March 23, 2024, from https://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/financial-development

World Bank. (2024). *Worldwide governance indicators*. Retrieved March 19, 2024, from https://www.worldbank.org/en/publication/worldwide-governance-indicators

Wu, Y. H., Bai, L., & Chen, X. (2023). How does the development of fintech affect financial efficiency? Evidence from China. *Economic research-Ekonomska istraživanja, 36*(2), 2980-2998. https://doi.org/10.1080/1331677X.2022.2106278

Yang, B. (2011). Does democracy foster financial development? An empirical analysis. *Economics Letters, 112*(3), 262-265. https://doi.org/10.1016/j.econlet.2011.05.012

Yao, Y., & Yueh, L. (2009). Law, finance, and economic growth in China: An introduction. *World Development, 37*(4), 753-762. https://doi.org/10.1016/j.worlddev.2008.07.009

Younsi, M., & Nafla, A. (2017). Financial stability, monetary policy, and economic growth: Panel data evidence from developed and developing countries. *Journal of the Knowledge Economy, 10*(4), 238-260. https://doi.org/10.1007/s13132-017-0453-5

Yudaruddin, R., Soedarmono, W., Nugroho, B. A., Fitrian, Z., Mardiany, M., Purnomo, A. H., & Santi, E. N. (2023). Financial technology and bank stability in an emerging market economy. *Heliyon, 9*(5), 1-19. https://doi.org/10.1016/j.heliyon.2023.e16183

Zaghlol, A. K., Ramdhan, N. A., & Othman, N. (2021). The nexus between fintech adoption and financial development in Malaysia: An overview. *Global Business & Management Research, 13*(4), 365-375.

Zeqiraj, V., Sohag, K., & Hammoudeh, S. (2022). Financial inclusion in developing countries: Do quality institutions matter? *Journal of International Financial Markets, Institutions and Money, 81*(1), 1-10. https://doi.org/10.1016/j.intfin.2022.101677

Zetzsche, D. A., Buckley, R. P., Barberis, J. N., & Arner, D. W. (2017). Regulating a revolution: From regulatory sandboxes to smart regulation. *Fordham Journal of Corporate and Financial Law, 23*(1), 31-103.

Zhang, X., Li, J., Xiang, D., & Worthington, A. C. (2023). Digitalization, financial inclusion, and small and medium-sized enterprise financing: Evidence from China. *Economic Modelling, 126*(1), 1-11. https://doi.org/10.1016/j.econmod.2023.106410

Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). *Business research methods*. Cengage Learning.

Zsohar, P. (2010). Short introduction to the generalized method of moments. *Hungarian Statistical Review, 16*(1), 150-170.

APPENDIX 1.1 RAW DATASETS FROM WORLD BANK

Year	Country Name	Code	Private	ROE	Branches	Stability	Population	GDP3	ATM	Mobile
2011	Afghanistan	1	4.95918	1.557554	2.215743	1.421801	29249157	-3.21136	0.615837	
2014	Afghanistan	1	3.941057	6.641262	2.304278	2.857143	32716210	-0.9648	0.749717	0.3
2017	Afghanistan	1	3.841881	5.103842	2.03512	0.47619	35643418	-0.25359	1.213245	0.91
2021	Afghanistan	1		11.39836		1.415094	40099462	-22.9292		0
2011	Burkina Faso	2	15.37034	25.07023	2.114397	28.90995	16602651	3.502707	2.218383	
2014	Burkina Faso	2	23.40561	22.33355	2.778538	20	18169842	1.263996	3.208425	3.08
2017	Burkina Faso	2	27.4216	19.36707	2.860826	15.71429	19835858	3.203257	3.972841	33.02
2021	Burkina Faso	2	29.42207			7.075472	22100683	4.11014		24.67
2011	Burundi	3	21.55991	28.33644	2.544962	4.739336	9455733	0.411512	0.712589	
2014	Burundi	3	19.29341		3.202569	20.47619	10494913	0.810603	1.508187	0.75
2017	Burundi	3	15.46373	19.33536		4.285714	11155593	-1.77265		
2021	Burundi	3	35.12281	28.06703		10.37736	12551213	0.381167		
2011	Central African Republic	4	9.180465		0.936584	5.21327	4732022	2.610235	0.977305	
2014	Central African Republic	4	12.79102		0.97927	0.47619	4798734	0.158112	0.69365	
2017	Central African Republic	4	11.21502		0.707527	4.761905	4996741	2.590924	1.375747	
2021	Central African Republic	4	11.79469			3.773585	5457154	-1.21028		
2011	Chad	5	4.848502		0.677751	11.37441	12317730	-3.35407	0.47285	
2014	Chad	5	7.801529		0.958969	8.095238	13697126	3.150989	0.465382	5.75
2017	Chad	5	12.15539		0.987501	9.523809	15085884	-6.16091	1.126763	15.23
2021	Chad	5	11.92053			10.84906	17179740	-4.27698		
2011	Congo, Dem. Rep.	6	4.022974	6.258746	0.610506	2.369668	68654269	3.351821	0.487847	
2014	Congo, Dem. Rep.	6	5.71798	7.644833	0.793978	4.761905	76035588	5.762182	1.107523	9.21
2017	Congo, Dem. Rep.	6	5.46584	-0.74835	0.87365	3.333333	84283273	0.216643	1.351642	16.1
2021	Congo, Dem. Rep.	6	7.221114			8.490566	95894118	2.832379		
2011	Gambia, The	7	10.40755		8.467367	47.39336	1998212	-10.9321	3.93831	
2014	Gambia, The	7	8.831186		8.300844	39.52381	2189019	-4.29668	5.623152	
2017	Gambia, The	7	6.092216	20.05743	6.902354	40.95238	2381182	2.006308	8.851254	

2021	Gambia, The	7	8.92115			53.30189	2639916	1.661892		
2011	Liberia	8	10.37426		3.753385	32.70142	4181150	4.029353	1.440252	
2014	Liberia	8	11.44045		3.742901	24.76191	4519398	-1.35045	1.791814	
2017	Liberia	8	16.75235	-0.1183	2.979866	32.85714	4796631	0.521366	2.725487	20.84
2021	Liberia	8		19.57045		38.67924	5193416	2.847282		36.3
2011	Madagascar	9	10.18025	24.34366	1.530433	24.64455	22348158	-1.22648	1.562823	
2014	Madagascar	9	11.66776	29.34692	1.901094	26.66667	24215976	0.659691	2.047332	4.36
2017	Madagascar	9	12.70612	32.98789	2.318851	33.80952	26169542	1.281905	2.795872	12.06
2021	Madagascar	9	17.6071			24.0566	28915653	3.214663		
2011	Malawi	10	9.573614	25.8168	1.094192	42.65403	15146094	1.969743	3.929146	
2014	Malawi	10	7.835986	37.6362	3.317783	50	16477966	2.720274	5.049779	3.84
2017	Malawi	10	7.478351	18.30004	2.214806	37.14286	17881167	1.234159	4.968074	20.3
2021	Malawi	10	8.093011	19.08809		45.28302	19889742	0.102867		34.35
2011	Mali	11	18.41145	18.97533	4.265749	24.17062	16039734	-0.07219	3.242462	
2014	Mali	11	22.06951	16.85267	5.64101	6.666667	17551814	3.742639	4.301696	11.64
2017	Mali	11	25.94822	10.45517	5.156143	6.190476	19311355	1.972295	4.877154	24.4
2021	Mali	11	28.28285			2.830189	21904983	-0.1509		29.38
2011	Mozambique	12	21.26554	10.75976	3.619544	58.29384	23760421	4.312923	6.499938	
2014	Mozambique	12	30.6355	16.01587	4.124341	32.38095	26038704	4.152586	9.220349	
2017	Mozambique	12	24.5425	20.12262	4.299693	15.2381	28569441	0.57147	11.06632	21.87
2021	Mozambique	12	23.59154	18.28841		11.32076	32077072	-0.5398		29.38
2011	Niger	13	9.922308	21.3405	1.254814	19.90521	17283112	-1.40635	0.914724	
2014	Niger	13	10.68004	20.58642	1.660588	10	19372014	2.68509	1.263718	3.85
2017	Niger	13	11.41486	16.73021	1.678859	10.47619	21737922	1.058945	1.725237	8.72
2021	Niger	13	13.02491			8.018867	25252722	-2.3029		
2011	Rwanda	14	13.26604	13.99776	5.555685	39.81042	10576932	5.22392	2.76955	
2014	Rwanda	14	17.63023	10.51899	5.940952	35.23809	11368451	3.672773	5.621055	18.1
2017	Rwanda	14	20.59441	5.325647	6.17657	50	12230339	1.391892	5.660694	31.11
2021	Rwanda	14	25.39703	16.12705		52.35849	13461888	8.277953		
2011	Sierra Leone	15	0.007694	21.13107	2.642018	40.28436	6612385	3.193215	0.373619	

2014	Sierra Leone	15	0.004889	14.62099		41.90476	7140688	1.984635		4.45
2017	Sierra Leone	15	0.005144	60.28109		45.71429	7677565	1.271949		11.02
2021	Sierra Leone	15	0.007128			41.98113	8420641	1.79688		19.04
2011	South Sudan	16	0.497601		0.754986	7.109005	10243050	-9.56171	0.629155	
2014	South Sudan	16	1.810109		1.904272	1.428571	11213284	2.384899	1.109445	
2017	South Sudan	16	1.705071		1.455225	1.428571	10658226		0.506165	
2021	South Sudan	16	2.750154			3.301887	10748272			0.85
2011	Sudan	17	9.291922	5.700714	3.019485	0.947867	34419624	6.364974	3.681696	
2014	Sudan	17	8.150647		3.196841	3.809524	37003245	1.797467	4.39226	
2017	Sudan	17	8.389756		3.318249	5.714286	40679828	-2.51569	5.389565	
2021	Sudan	17	6.619864			5.188679	45657202	-4.48362		
2011	Togo	18	20.69708	27.2001	4.448819	40.75829	6748672	3.610538	3.177728	
2014	Togo	18	26.19771		4.909314	38.57143	7288383	3.273382	5.516902	1.41
2017	Togo	18	29.60258	15.57167	5.586447	17.14286	7852795	1.803885	3.98396	21.46
2021	Togo	18	26.86857			19.81132	8644829	3.51186		36.48
2011	Uganda	19	11.6564	27.86962	2.450843	18.00948	33295738	6.257298	3.878065	
2014	Uganda	19	12.90356	17.10112	3.052483	15.2381	36336539	2.031586	4.455683	35.1
2017	Uganda	19	13.48192	16.24015	2.665242	26.19048	40127085	-0.41224	4.196143	50.58
2021	Uganda	19	14.78697	11.56103		18.39623	45853778	0.264401		53.8
2011	Yemen, Rep.	20	5.068726		1.794537	1.895735	25475610	-15.2217	3.647196	
2014	Yemen, Rep.	20			1.675659	0.952381	27753304	-2.95539	6.439788	
2017	Yemen, Rep.	20		15.07115		0	30034389	-7.47511		
2021	Yemen, Rep.	20				0.943396	32981641			
2011	Algeria	21	14.74637	14.07895	5.208	10.90047	37268243	1.057724	6.273423	1.5
2014	Algeria	21	20.97984	11.62382	5.240887	11.26984	39547550	1.525249	8.175924	5.82
2017	Algeria	21	25.0373	11.46727	5.228199	15.77418	41922974	-0.73733	9.434187	4.95
2021	Algeria	21	27.68001	8.307635	5.264866	17.92453	43814818	-2.51494	8.90217	3.79
2011	Angola	22		18.99549	9.186368	34.91311	25198135	1.766441	14.96955	7.94
2014	Angola	22	23.16926	16.81594	10.30591	31.42857	28136935	-2.54138	18.69224	5.66
2017	Angola	22	15.75896	19.85603	9.741104	32.64301	31278583	-4.10816	18.81647	

2021	Angola	22	12.06747	3.369195	8.746814	23.82076	33966130	-5.31352		
2011	Bangladesh	23	42.42189	16.02615	8.06524	8.530806	152110598	5.019411	4.234811	23.33
2014	Bangladesh	23	41.98058	9.86913	8.590823	12.53968	157858622	5.280683	6.96434	10
2017	Bangladesh	23	39.83605	9.18394	8.921837	13.39922	163664715	6.011449	8.899	9.21
2021	Bangladesh	23	39.12154	8.634091	8.987172	15.80189	168388601	3.993879	10.53077	14.22
2011	Benin	24	16.22529	16.19223	3.308625	57.97788	10016396	1.973414	3.651069	4.19
2014	Benin	24	16.98506	7.518947	3.577929	46.50794	10935904	0.814891	4.655116	7.74
2017	Benin	24	16.97835	4.562583	3.527744	39.61366	11942635	3.350775	4.853909	11.36
2021	Benin	24	15.5616		3.424184	33.72641	12820009	2.595323	4.475593	8.2
2011	Bhutan	25	47.16207		15.98043	70.93207	721121.67	3.937998	14.78375	
2014	Bhutan	25	46.54411	13.90178	16.52245	87.14286	743130.67	5.848348	29.11912	4.21
2017	Bhutan	25	57.68563	12.12073	18.68737	88.95927	761892	3.678293	43.82417	
2021	Bhutan	25	71.06287	3.073415		84.66981	774996	-3.58836		
2011	Bolivia	26	43.86989	16.4933	26.0301	34.2812	10569764	3.973555	27.61328	16.62
2014	Bolivia	26	57.4541	15.32554	35.0178	35.55556	11090029	3.222267	37.25644	22.11
2017	Bolivia	26	67.86239	12.21426	42.04881	30.61096	11606584	2.015266	40.69367	19.98
2021	Bolivia	26		6.044169	68.80697	31.60377	12007817	-2.55272	42.30782	19.29
2011	Cambodia	27	39.66923	12.62235	4.513036	39.81043	14786736	5.708441	7.227891	19.47
2014	Cambodia	27	72.88441	13.54818	6.351496	49.84127	15417641	5.567756	12.91347	28.44
2017	Cambodia	27	100.1401	11.21903	7.884473	49.0581	16021224	5.872324	19.81498	26.73
2021	Cambodia	27	152.9296	10.92945	11.99172	42.21698	16492942	-1.19035	28.97795	30.88
2011	Cameroon	28	12.56651	16.50981	1.839556	26.85624	21038136	1.432599	2.694281	4.45
2014	Cameroon	28	14.0963	12.83306	2.022327	13.65079	23007954	2.135311	3.935532	2.09
2017	Cameroon	28	14.37271	14.49604	2.08428	9.630129	25084090	0.80441	4.597383	7.7
2021	Cameroon	28		17.22337	2.152197	10.14151	26844858	-0.73443	5.039133	6.98
2011	Comoros	29	11.8409		2.326274	33.49131	684672.33	1.731927	6.143289	7.21
2014	Comoros	29	15.19795		2.934763	41.11111	730353.33	0.006989	5.015084	
2017	Comoros	29	15.90722		3.305769	41.50344	776321	1.090725	5.098111	
2021	Comoros	29	15.53646		3.583013	38.4434	813895.5	-0.94196	6.223127	
2011	Congo, Rep.	30	7.820271		2.860813	32.06951	4708513	0.935655	2.946202	3.17

2014	Congo, Rep.	30	15.42596		3.708522	27.77778	5065357	-4.84002	7.731762	5.08
2017	Congo, Rep.	30	14.91536		4.04441	26.03025	5441378.3	-5.37057	9.504364	5.2
2021	Congo, Rep.	30	16.21979			22.40566	5768990	-6.42004		6.19
2011	Cote d'Ivoire	31	13.72306	15.35675	4.432801	12.48025	22014298	2.205574	4.783204	
2014	Cote d'Ivoire	31	16.36728	23.16789	4.865875	16.34921	23601973	5.258371	6.722012	2.71
2017	Cote d'Ivoire	31	19.24235	21.61043	5.088965	14.03414	25496518	3.570304	6.668628	2.71
2021	Cote d'Ivoire	31	20.9362	19.78325	4.899846	15.33019	27145020	1.810987	7.3044	4.09
2011	Djibouti	32	27.33457	20.37865	4.887118	49.13112	954287		4.085267	4.48
2014	Djibouti	32	21.44575	10.51666	5.725131	25.07937	1006202.3	5.406647	8.285965	
2017	Djibouti	32	21.71915	10.44688	8.180038	31.3522	1057141.7	3.575033	12.53783	
2021	Djibouti	32	19.80899		8.542774	25.4717	1097856.5	1.520871	16.23127	
2011	Egypt, Arab Rep.	33	28.25527	14.03657	4.583338	7.109005	91272773	-0.22362	10.16076	3.65
2014	Egypt, Arab Rep.	33	28.68598	20.69356	4.637983	8.412698	97700051	1.606524	13.81523	7.68
2017	Egypt, Arab Rep.	33	24.73794	19.92109	5.502475	11.19197	103716274	3.05131	18.83355	8.76
2021	Egypt, Arab Rep.	33	27.01011	14.89168	6.758203	13.20755	108363656	1.681393	22.06102	7.29
2011	Eswatini	34	20.80484	19.72536	7.177679	32.54344	1111711.3	3.262154	28.63244	11.51
2014	Eswatini	34	20.88686	20.34216	7.42091	28.4127	1134108.3	0.683205	38.24809	
2017	Eswatini	34	20.90247	18.09828	6.680489	34.85924	1160477	1.569793	38.52055	
2021	Eswatini	34	21.42303		6.751497	46.93396	1186463	2.175963	39.82005	
2011	Ghana	35	16.85312	25.04151	5.52663	50.39494	26863433	7.549732	5.765526	5.75
2014	Ghana	35	17.29137	23.10915	6.634405	42.22222	28873867	0.375767	9.631909	8.33
2017	Ghana	35	14.58362	20.50519	8.421043	49.5313	30871731	4.671534	11.31533	11.6
2021	Ghana	35	13.09293	21.00711	6.142757	51.17924	32506716	0.860323	11.45112	7.4
2011	Guinea	36	6.692764	31.5392	1.76883	11.05845	10790611	2.608343	1.247458	2.45
2014	Guinea	36	10.84294	19.16536	2.682503	26.19048	11630116	3.451285	2.207508	2.62
2017	Guinea	36	9.686442	20.29143	2.758491	18.77808	12557731	4.725554	2.49419	5.84
2021	Guinea	36	9.591424	30.24973	2.727542	19.33962	13368530	1.854191	2.540358	6.11
2011	Haiti	37	10.03176	22.77016	2.687366	21.32701	10108019	1.887796		8.34
2014	Haiti	37	10.87948	25.54231	2.674433	22.53968	10563449	0.576009	1.471036	5.92
2017	Haiti	37	10.46712	28.18178	2.692931	21.13956	11012134	-0.54514	2.728743	12.86

2021	Haiti	37	8.47414	16.03056	2.623484	13.20755	11377185	-3.78149		
2011	Honduras	38	51.10252	14.2535	20.68272	34.12322	8791842.7	1.582528	22.02275	7.1
2014	Honduras	38	55.84808	11.31982	20.04547	29.20635	9294383	1.738467	23.22922	13.43
2017	Honduras	38	61.5767	11.06523	18.90571	26.65618	9792840.3	2.020466	24.47037	14.17
2021	Honduras	38	68.3921	8.016492	15.80684	26.41509	10200054	0.194771	24.98377	10.32
2011	India	39	51.85448	14.42282	11.13945	11.37441	1.274E+09	4.297836	10.86154	7.7
2014	India	39	50.95031	6.469738	13.51499	15.23809	1.323E+09	6.596079	19.51173	9.12
2017	India	39	49.95822	-0.92276	14.52741	17.51123	1.369E+09	4.560872	21.53439	8.15
2021	India	39	52.49194	9.102433	14.74268	22.16981	1.402E+09	0.729038	21.49655	11.78
2011	Iran, Islamic Rep.	40	47.82044		29.55093	9.636651	77375450	-2.19071	44.71799	30.65
2014	Iran, Islamic Rep.	40	55.21798	4.703615	31.76568	17.46032	81686248	2.072674	65.80444	37.81
2017	Iran, Islamic Rep.	40			29.83928	10.10931	85562280	-1.98198	83.08364	27.81
2021	Iran, Islamic Rep.	40				7.075472	87606813	3.21823		25.1
2011	Jordan	41	71.21407	7.80279	16.16245	28.594	7338885.7	-0.89772	24.8877	4.47
2014	Jordan	41	68.1094	7.314162	15.09253	26.8254	9372309.3	-5.82308	25.32027	14.52
2017	Jordan	41	75.67133	8.841843	14.44822	33.11321	10457976	-0.34157	27.67947	17.8
2021	Jordan	41	83.73631	4.341174	14.0855	36.79245	11038500	-1.73396	30.56481	9.86
2011	Kenya	42	27.36679	22.65787	5.129489	12.32227	43717773	1.884371	9.290345	9.74
2014	Kenya	42	35.59749	18.7374	5.477715	9.523809	46859340	2.421725	9.497573	15.96
2017	Kenya	42	31.72711	16.48376	4.999532	12.14435	49950964	2.72673	8.758795	19.24
2021	Kenya	42	31.63647	12.2053	4.529933	13.91509	52495697	1.631728	7.121569	22.17
2011	Kyrgyz Republic	43	13.50729	25.03624	7.570812	17.53554	5613800	3.890787	16.06389	11.3
2014	Kyrgyz Republic	43	21.16021	12.02296	8.201038	20.47619	5957300	1.982889	28.84398	14.71
2017	Kyrgyz Republic	43	23.13014	7.923311	8.078439	32.48727	6325733.3	2.295545	36.63626	10.22
2021	Kyrgyz Republic	43	26.9302	7.284136	7.545863	30.18868	6635850	-2.86407	41.80633	17.73
2011	Lebanon	44	91.08683	10.42257	24.95083	6.161138	5300748	-1.83855	34.80378	11.27
2014	Lebanon	44	100.9303	10.91455	23.03897	7.460317	6310633.7	-1.635	35.88484	20.76
2017	Lebanon	44	106.5677	4.298527	22.05967	7.416891	5947332.7	-0.03268	38.88685	22.62
2021	Lebanon	44		-3.48952	19.34	8.726415	5627777	-12.7904	35.17967	3.31
2011	Lesotho	45	17.62161	30.61743	3.427425	58.45182	2055444.7	3.383267	9.191233	3.04

2014	Lesotho	45	18.60584	29.64913	3.697528	35.39683	2119211.7	1.683686	12.95535	
2017	Lesotho	45	20.35365	20.68867	3.759885	36.12908	2198112	-3.013	14.28916	5.57
2021	Lesotho	45	22.59255	9.006556	3.788839	39.62264	2267777	-3.23421	13.91537	
2011	Mauritania	46	17.23522	5.180642	5.258656	15.48183	3634440.3	1.16971	5.154862	7.85
2014	Mauritania	46	20.3116	3.568939	7.684399	23.1746	3947094.7	0.933513	9.14678	9.12
2017	Mauritania	46	21.78283	0.185012	10.30433	24.7634	4271525.3	2.714689	10.36835	9.25
2021	Mauritania	46		2.800933	11.19654	22.16981	4556789	-1.80167	11.01825	
2011	Mongolia	47	49.03003	18.42064	68.1928	63.82307	2793813.3	11.82322	41.95013	24.79
2014	Mongolia	47	56.8993	12.79887	70.39718	71.90476	2965709	1.767353	72.91629	36.21
2017	Mongolia	47	52.3752	9.257951	67.65918	71.45702	3164150.3	4.055228	85.46853	30.37
2021	Mongolia	47	46.63577	10.63211	62.59479	69.10378	3321058.5	-3.16855	47.98639	34.39
2011	Morocco	48	86.04385	12.5162	22.75302	31.75355	33353132	2.83639	22.83767	
2014	Morocco	48	80.71122	10.57952	24.48019	32.53968	34678775	6.589877	26.06004	
2017	Morocco	48	80.20857	9.646928	24.79147	33.1177	35920011	2.498127	27.86039	2.64
2021	Morocco	48	88.47961	6.500502	23.15911	33.72641	36882678	-0.69118	28.76621	4.98
2011	Myanmar	49	10.22442	-31.7455	2.09232	15.79779	50220347	6.406137	0.348547	
2014	Myanmar	49	19.73322	19.68385	3.382514	13.33333	51482911	6.463677	2.09967	15.52
2017	Myanmar	49	27.78291	9.810468	5.13548	11.83438	52664856	5.529489	5.625377	19.09
2021	Myanmar	49	27.73452	21.62477		7.311321	53610641	-8.02541		7.06
2011	Nepal	50	48.54709	17.39124	8.169482	10.42654	27326216	3.593648	7.822577	10.76
2014	Nepal	50	60.40537	20.84662	9.536624	17.61905	27644539	2.882412	9.732376	11.99
2017	Nepal	50	74.6092	16.01336	15.12918	26.96765	28507545	6.52835	13.90035	13.64
2021	Nepal	50	96.0457	11.43255	21.8914	39.85849	29691808	-0.82209	20.02831	14.1
2011	Nicaragua	51	28.93333	22.16795	7.169684	37.75671	6030846.3	4.369957	11.7725	7.63
2014	Nicaragua	51	36.43079	22.20335	8.909069	43.49206	6298836.3	3.217915	17.3503	15.51
2017	Nicaragua	51	38.2628	14.03482	9.800576	24.3531	6572229.7	-1.92891	20.60381	13.43
2021	Nicaragua	51	29.0222	8.216644	7.981596	27.35849	6803217.5	2.85941	21.5771	12.18
2011	Nigeria	52	11.06052	18.6114	6.043151	3.475513	170088600	2.557627	12.24951	2.06
2014	Nigeria	52	13.66124	11.42296	5.109687	5.873016	184013911	-0.14119	16.37935	6.98
2017	Nigeria	52	11.41872	16.27348	4.507796	4.890686	198396007	-0.85457	16.81778	5.3

2021	Nigeria	52	12.84632	13.05178	4.446565	5.424528	210864364	-1.48962	16.1467	6.4
2011	Pakistan	53	17.06063	13.43976	8.777731	0.789889	202048720	1.689726	5.433422	1.57
2014	Pakistan	53	15.21909	15.98955	9.635623	2.063492	210915255	3.618589	8.388149	1.57
2017	Pakistan	53	15.87805	10.64686	10.28987	2.678946	219801471	2.816636	10.43125	2.64
2021	Pakistan	53	15.19223	13.78534	10.31473	5.896226	229299429	0.790777	11.14124	3.51
2011	Philippines	54	32.24625	13.38311	7.943863	13.11216	98023446	4.012784	19.19375	10.51
2014	Philippines	54	40.11553	11.33071	8.739254	16.98413	103077277	4.831709	25.08965	12.89
2017	Philippines	54	47.04722	10.33376	9.071651	13.55795	108562714	4.663207	28.66986	10.7
2021	Philippines	54	50.98851	8.532783	9.169059	18.86792	113035653	-3.41584	29.71694	17.45
2011	Senegal	55	24.87448	13.47067	4.680586	40.75829	13234426	-0.1698	4.868847	3.5
2014	Senegal	55	27.4733	5.231516	4.997092	38.88889	14359282	3.463215	5.44371	3.97
2017	Senegal	55	29.57769	16.58419	5.709284	44.94909	15577828	3.240525	5.775329	7.82
2021	Senegal	55	29.57794	9.23555	5.222405	41.98113	16656420	1.20805	6.418773	9.97
2011	Sri Lanka	56	33.7654	20.03261	17.86907	24.01264	21002882	6.326504	15.77734	17.74
2014	Sri Lanka	56	38.78371	17.26789	18.55023	43.80952	21333883	4.72928	17.04854	19.73
2017	Sri Lanka	56	45.86322	13.96932		41.01378	21659938	2.25621		17.37
2021	Sri Lanka	56		11.13798		39.85849	22037500	-1.36215		21.28
2011	Tajikistan	57	16.40892	-1.46257	6.245558	14.06003	7959270.3	5.117911	8.572422	4.76
2014	Tajikistan	57	20.81517	0.018423	6.786147	20.47619	8525243	4.087678	13.91333	4.15
2017	Tajikistan	57	12.17974	7.036795	4.718872	23.18509	9130220	4.968939	12.96397	15.48
2021	Tajikistan	57	11.6881	11.67744	4.529533	26.41509	9646635.5	4.61158	21.47767	12.42
2011	Tanzania	58	12.57025	15.49018	2.205876	44.86572	47818604	3.254727	5.239134	6.61
2014	Tanzania	58	13.86253	13.16609	2.298295	28.57143	52586392	3.118145	5.836364	6.74
2017	Tanzania	58	12.80487	6.541075		28.23001	58076685	2.682745		5.29
2021	Tanzania	58	12.43518	12.46732		29.48113	62646426	0.084384		4.45
2011	Tunisia	59	72.84558	6.649148	17.47515	25.59242	11169065	0.30509	22.17246	
2014	Tunisia	59	75.22985	14.09403	19.96174	15.55556	11557465	0.59427	26.22058	12
2017	Tunisia	59	81.7126	14.78537	22.00279	16.23839	11931266	1.111978	30.97129	11.73
2021	Tunisia	59		10.97981	22.30717	23.82076	12212335	-3.05855	33.85192	9.89
2011	Ukraine	60	68.71961	2.737205	1.199351	35.38705	45596359	2.166204	93.71973	8.15

2014	Ukraine	60	59.73124	-17.5913	0.610092	5.873016	45143621	-3.82143	90.32652	21.75
2017	Ukraine	60	34.28136	18.91577	0.436471	7.096436	44613285	3.54025	97.17112	21.76
2021	Ukraine	60	25.8654	16.5393	0.409954	12.0283	43962452	0.6084	93.73923	34.12
2011	Uzbekistan	61	9.327727	11.708	45.98044	28.43602	29785700	5.282858	6.338038	1.46
2014	Uzbekistan	61	10.69771	14.3567	34.08946	35.39683	31301500	4.852331	13.55453	2.23
2017	Uzbekistan	61	22.44375	10.69914	38.14378	36.59778	32975017	3.573461	30.28404	2.36
2021	Uzbekistan	61	35.55822	5.936135	42.44415	35.37736	34573575	2.67802	48.41382	7.49
2011	Vietnam	62	77.68353	11.08021	11.40525	55.60822	89306061	4.695422	68.88873	16.18
2014	Vietnam	62	89.75307	7.974149	12.65177	49.68254	92184477	5.596644	78.33428	19.5
2017	Vietnam	62	105.76	13.43932	13.28392	50.80114	94908031	6.25634	88.18147	21.72
2021	Vietnam	62	119.9613	17.31974	12.45164	45.04717	97058357	1.818372	95.84636	
2011	Zambia	63	15.12298	18.52476	4.344766	64.45498	14748483	2.612825	8.256606	6.13
2014	Zambia	63	17.43169	13.55174	4.812013	52.38095	16251261	0.533779	11.06585	5.65
2017	Zambia	63	15.16864	15.52742	3.943722	48.74963	17838141	-0.11187	11.09436	10.41
2021	Zambia	63	13.25975	18.24724	3.157848	45.75472	19200420	-1.96332	10.02738	6.75
2011	Zimbabwe	64	19.28526	18.6341	10.96717	21.80095	13282179	9.208804	4.725113	4.88
2014	Zimbabwe	64	18.20821	10.11816	8.864746	23.80952	14154465	-0.67528	6.754893	4.33
2017	Zimbabwe	64	9.31436	23.12244	4.959345	18.61935	15052631	-1.09769	6.637575	4.72
2021	Zimbabwe	64	6.201809	13.93351	4.169702	13.67925	15831595	-1.6994	6.161893	2.89

Where:

Private = Domestic Credit to Private Sector (% of GDP)   Population = Population, Total

ROE = Bank Return on Equity (%, After Tax)   GDP3 = GDP per Capita Growth (Annual %)

Branches = Bank Branches per 100,000 Adults   ATM = ATMs per 100,000 Adults

Stability = Political Stability and Absence of Violence/Terrorism   Mobile = Mobile Money Account (% Age 15+)